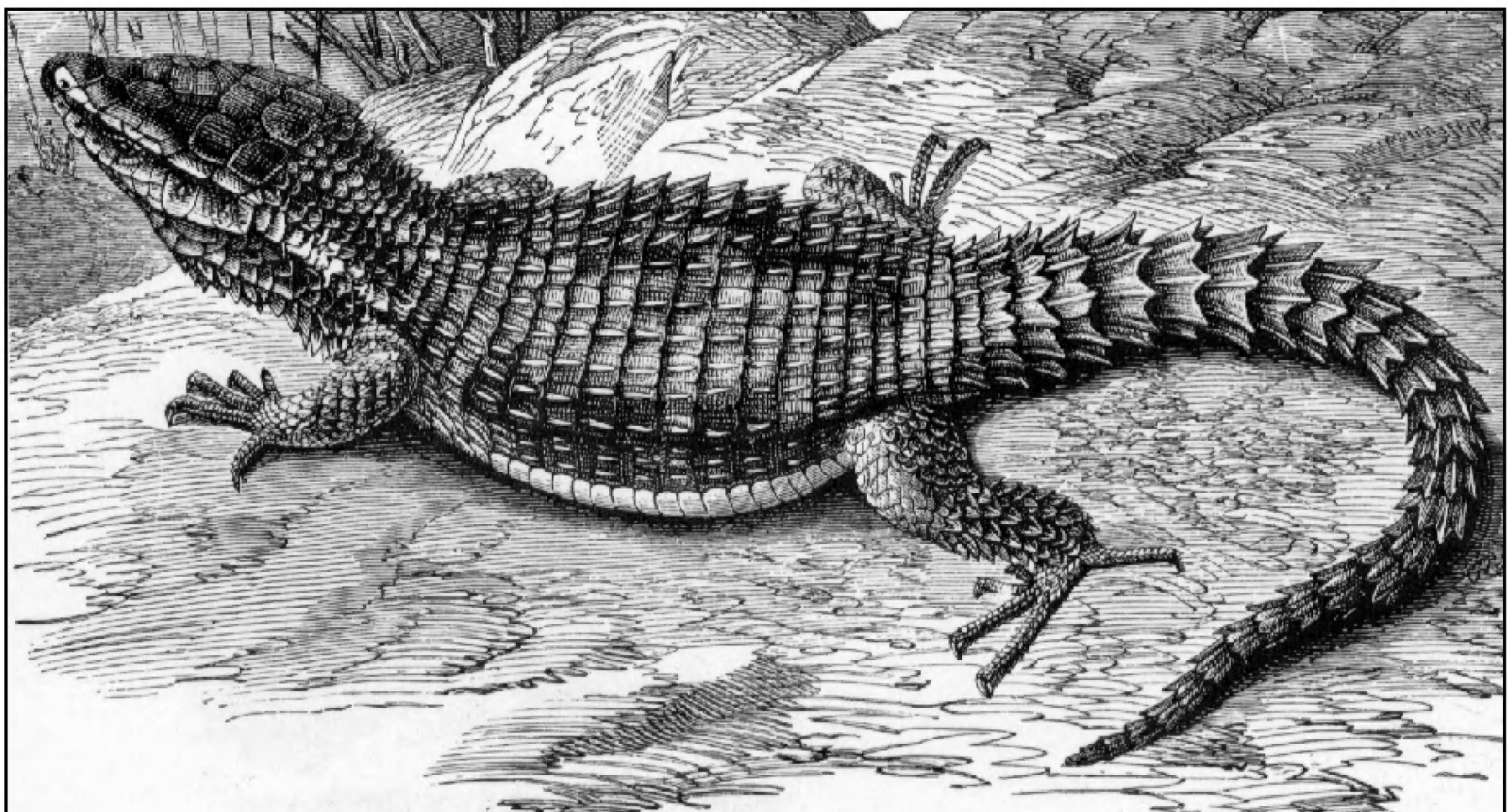

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A Documented Case of an Attack by Morelet's Crocodile (*Crocodylus moreletii*) on Man

Jacob A. Marlin¹, Kelly K. Marlin¹ and Steven G. Platt²

Most species of crocodilians are perceived as dangerous to man, but only the Nile crocodile (*Crocodylus niloticus*) and the Indo-Pacific crocodile (*C. porosus*) regularly kill humans (Neill, 1971; Guggisberg, 1972; Webb et al., 1978; Pooley et al., 1989; Webb and Manolis, 1989). The American alligator (*Alligator mississippiensis*), mugger (*C. palustris*), Orinoco crocodile (*C. intermedius*), American crocodile (*C. acutus*), and black caiman (*Melanosuchus niger*) are known to occasionally attack humans, but this behavior is considered rare (Neill, 1971; Guggisberg, 1972; Pooley et al., 1989; Hall, 1991).

Morelet's crocodile (*C. moreletii*) inhabits freshwater wetlands in the Atlantic lowlands of Mexico, Belize and Guatemala (Groombridge, 1987). Total length (TL) of adults ranges from 2 to 3 m, although individuals up to 4.25 m have been reported (Pérez-Higareda et al., 1991). Morelet's crocodiles are not usually considered maneaters, but anecdotal reports of attacks are present in the literature.

In his account of collecting the type specimen of *C. moreletii*, Morelet (1871) stated:

... the reptiles [Morelet's crocodiles] do not hesitate, whenever the opportunity offers, to snap up a straggler without scruple. The hacienda of San Geronimo has itself furnished several victims to their greedy maws. Only recently an Indian crossing the ford ... had fallen into the stream and become the prey of these monsters.

Sanderson (1941), traveling in British Honduras (Belize), provided a somewhat fanciful account of an attack by a Morelet's crocodile estimated to be 3.0–3.6 m long. Sanderson and his wife were standing on a log overhanging the water when "a sort of aqueous volcano began to erupt just beneath us, and shook us to the core." Sanderson nearly fell "... straight into the jaws of quite the biggest crocodile ... I ever had the misfortune to encounter. The brute ... suddenly came charging up from the depths ... with one cruel, greenish-yellow eye fixed upon us." The crocodile began "advancing with his forehead and snout cutting the water ... a very evil sight." It is unclear from this account if the crocodile was exhibiting predatory or territorial defense behavior. The large size of the animal suggests that it was a male and that the latter may have been the case.

More recently Neill (1971) stated that according to a "probably reliable" account, a crocodile, presumed to be *C. moreletii*, attacked a young child in the Petén region of Guatemala, but concluded such attacks are rare. Alvarez del Toro (1974) stated that rumors of man-eating by large individuals remain to be confirmed. Abercrombie et al. (1982) reported a man was allegedly killed and eaten by a Morelet's crocodile in a roadside pond near Orange Walk Town, Belize, but were unable to verify the incident.

In Belize, Morelet's crocodiles are generally perceived as being a danger to both humans and livestock. While questioning rural inhabitants in conjunction with crocodile surveys (1992–1994), several reports of crocodile attacks were brought to our attention. However, none of the informants were personally involved in these incidents, or knew the victims. These stories have been widely circulated and are fast becoming part of the rural Belizean folklore. In September 1994, we were contacted by the Forestry Department and requested to investigate a recent crocodile attack. The victim was interviewed and attempts were made to capture the crocodile.

On 25 August 1994, at approximately 0900 hours, Robert Flowers, a 14-year-old male, was spearfishing in Hector Creek (ca. 1 km downstream from the Western Highway Bridge), near Hattieville, Belize. Robert was swimming slowly along the surface in a face-down horizontal position, searching for fish, wearing a glass diving mask and carrying a homemade speargun. The crocodile did not exhibit any threat behavior prior to the attack and Robert was unaware of its presence. The crocodile approached on the surface perpendicular to his line of sight, seized him by the head, and began shaking him violently. Disoriented, Robert fired his speargun at the animal. The spear pierced the crocodile's flank whereupon it released the victim and swam away. Robert staggered out of the creek and, assisted by a companion, walked the 2 km to Hattieville, from where he was transported to a hospital in Belize City. Robert estimated the size of the attacking crocodile at about 2.4 m TL, which is consistent with the observed pattern of bite wounds.

Robert suffered deep puncture wounds on the neck, upper back and head, a large laceration to the right shoulder, and a fracture to the supraorbital region of the frontal bone. The heavy diving mask worn by the victim undoubtedly prevented further facial injuries. Robert received treatment for his wounds and recovered rapidly. There was no tissue necrosis or infection which often accompanies crocodile bite wounds (Webb and Manolis, 1989).

Considerable public outcry followed the attack; a number of villagers requested the total elimination of all crocodiles in the area. Our attempts to identify and capture the animal proved unsuccessful. The crocodile probably had moved downstream in the swift floodwaters.

At the time of the incident, water levels in Hector Creek were elevated following heavy rains, and the water was murky and discolored. Such conditions may favor crocodile attacks on humans (Pooley et al., 1989). Causal factors underlying the attack remain speculative. Pooley et al. (1989) stated crocodile attacks may result from females defending nests, territorial defense by males during the breeding season, or hunger. Allowing for the possibility of nest defense by a

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female, the area in the vicinity of the attack was searched, but a nest was not located. The attack occurred in a low, swampy segment of the creek, habitat not normally favored by crocodiles for nesting (Platt and Montanucci, 1994). Furthermore, nesting females generally exhibit warning behavior before attacking and aggression is short-lived (Pooley et al., 1989; S. Platt, pers. obs.).

Territorial defense behavior may have provoked the attack as the size of the crocodile strongly suggests it was a male, and the victim was swimming in a horizontal position, possibly resembling a crocodile. Male crocodiles have been noted to attack small boats, presumably mistaking them for rival crocodiles (Pooley et al., 1989; Webb and Manolis, 1989). However, this attack occurred in September, well past the April to June breeding season (Platt and Montanucci, 1994) when aggression among males is most pronounced (Pooley et al., 1989).

We speculate this attack may have been motivated by hunger. Adult crocodiles normally feed on small prey such as turtles, crabs, fish, molluscs and wading birds, but occasionally take dogs and goats, and even dismember cattle carcasses (Pérez-Higareda et al., 1989; Platt and Montanucci, 1994). The victim is not a large individual and is probably within the size range of prey that an adult crocodile could subdue. American alligators, crocodilians comparable in size to *C. moreletii*, have killed humans in the United States (Pooley et al., 1989).

Although this case lends credence to previous reports of crocodile attacks, such behavior must nonetheless be considered rare. Our field experience indicates that while potentially dangerous, Morelet's crocodiles normally pose little threat to humans. In numerous visits to 68 crocodile nests from 1992 to 1994, only one instance of female aggression has been ob-

served (Platt and Montanucci, 1994). Throughout Belize, people regularly enter waters inhabited by Morelet's crocodile without incident. In Sapote Lagoon (Corozal District), which contains an estimated 100+ crocodiles, spearfishermen routinely swim in the lagoon and surrounding marsh. Cowboys and ranch-hands regularly bathe in Gold Button Lagoon (Orange Walk District) where 160+ crocodiles have been counted during spotlight surveys, including at least four individuals exceeding 3.3 m TL (Platt and Montanucci, 1994). Nevertheless, to avoid the possibility of crocodile attacks, it is recommended that people avoid entering waters known to be inhabited by large adult crocodiles.

While this case is certainly regrettable, complete elimination of crocodiles in the vicinity of villages is unwarranted. For the most part, crocodiles pose no danger to humans, and indeed have considerable value from an ecotourism standpoint (Hunt and Tamarack, 1992). Finally, if removal is deemed necessary, it should selectively target very large (2.5 m+) or aggressive animals.

Acknowledgments

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Post-Fire Herpetofauna of Mogan Ridge, Hoosier National Forest, Indiana

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Introduction

In 1988, the Forest Service began prescribed burning of small (< 2 ac), prairie-like parcels on the Hoosier National Forest (S. Olson, pers. com.). Larger, landscape burns were initiated in 1990 (T. Krueger, pers. com.). Prescribed fires are being used to suppress encroachment of woody vegetation into barrens communities, and reduce invasion of shade-tolerant hardwoods, such as red maple (*Acer rubrum*), onto oak ridges. It is believed that periodic presettlement fires, ignited by lightning or native Americans, regularly burned across the landscape, maintaining the barrens and open oak forests of the midwest (Guyette and Cutter, 1991; Robertson and Heikens, 1994). After native Americans were forced from their ancestral lands, fires were set regularly by early European settlers to maintain open pasture for cattle grazing (Guyette and Cutter, 1991, Robertson and Heikens, 1994).

The effect of prescribed fire on the herpetofauna of the Hoosier National Forest is unknown. In fact, very little work documenting the benefit or detriment of prescribed fire on midwestern herpetofauna has been conducted (Erwin and Stasiak, 1979 and references within). With the increased acceptance and usage of fire as a management tool, such work is urgently needed.

Minton (1972) speculated that fire, in part, was responsible for the demise of the timber rattlesnake (*Crotalus horridus*) in the New Albany area. He did not, however, elaborate on the subject. Timber rattlesnakes are periodically observed in the Mogan Ridge area by Forest Service personnel and hunters (R. Lutz, pers. comm.). The most recent reported Mogan Ridge sighting in 1992 occurred during a herpetofaunal survey of the HNF (Ewert et al., 1993). The Mogan Ridge rattlesnake population appears to be one of the largest in Indiana south of the species' stronghold in Brown, Monroe and Morgan counties (Minton et al., 1982). Therefore, determining the impact, if any, of the re-introduction of fire on timber rattlesnakes is of critical importance.

This survey was initiated to 1) determine whether any

direct mortality of amphibians or reptiles occurred as a result of the fire, and 2) assess the herpetofaunal diversity and abundance following the fire.

Study area

The 1994 Mogan Ridge prescribed fire was ignited at 1615 EST on 18 April, and burned through the night. The fire encompassed approximately 405 hectares, of which about 80% burned (T. Krueger, pers. com.). The burn encompassed parts of Sections 13, 14, 23 and 24, T5S, R2W, and parts of Sections 18 and 19, T5S, R1W. The area consists of ridges and valleys carved by tributaries of Oil Creek (Indian Fork and Ash House Branch) and Poison Creek (Long Run). The ridges and dry slopes investigated support oak-hickory forest. Chestnut oak (*Quercus prinus*) dominates the overstory, although white oak (*Q. alba*), red oak (*Q. rubra*), black oak (*Q. velutina*), and hickory (*Carya* sp.) are also important components. Midstory vegetation includes red maple, persimmon (*Diospyros virginiana*), sassafras (*Sassafras albidum*), blackgum (*Nyssa sylvatica*), tulip poplar (*Liriodendron tulipifera*), flowering dogwood (*Cornus florida*), and redbud (*Cercis canadensis*). Red maple, tulip poplar and blackgum occasionally attain canopy status on the ridges and upper slopes. The groundcover, which is typically sparse, consists of young of the aforementioned trees, greenbrier (*Smilax* sp.) and various shrubs, graminoids and forbs.

Methods

The herpetofauna was sampled during four visits: 13 and 27 May, and 3 and 25 June 1994. A catch-per-unit-effort (CPUE) was obtained by timing the searches. I actively searched from 4 to 6.25 hours per trip, for a total of 20 hours. I restricted the survey to west-, southwest-, south- and southeast-facing slopes where historically fires would have burned the hottest and maintained an open canopy. I avoided unburned areas, roads and roadsides, pine stands, and the vicinity of ponds and streams. I did not search an area more than once.

I used a long-handled potato rake to remove bark from downed logs and standing snags, rake through organic debris (e.g., bark piles, leaf mold, rotted logs), and to turn rocks and logs. Whenever feasible, disturbed cover was replaced. I also made a visual search of the substrate as I traversed the area.

Weather conditions

During this study southern Indiana experienced a period of drought. By the fourth sample trip, the Evansville area was 17.1 cm below normal mid-year rainfall accumulation (Evansville Courier, 26 June 1994). It is not known if reduced rainfall affected which amphibian or reptile species were encountered, or whether the numbers of individuals encountered were elevated or diminished. However, reduced soil moisture would be expected to reduce the number of amphibian species and individuals encountered. The weather conditions of each sampling trip are summarized below.

13 May 1994: The air temperature near the shaded ground surface at 0900 EST was 15.5°C; by 1130 EST it had risen to 19°C. The sky was partly cloudy.

27 May 1994: At 0850, the air temperature near the shaded soil surface was 14.5°C; by 1205 EST it rose to 17°C. The sky was partly cloudy.

3 June 1994: The air temperature near the shaded soil surface was 20°C at 1445 EST. The sky was mostly cloudy. It had rained (8 mm) the previous day.

25 June 1994: At 0800 EST the air temperature near the shaded soil surface was 18.5°C; by 1100 EST it had risen to 22.5°C; and by 1530 EST it was 26°C. The sky was sunny in the morning, but partly cloudy in the afternoon. It had rained 8 mm before dawn, breaking a 10-day heatwave.

Results and discussion

I observed a total of 97 individual amphibians and reptiles comprised of 16 species during 20 hours of sampling (Table 1). The number of individuals observed per trip ranged from 20 to 31 (mean = 24). Although the sampling methods employed undoubtedly favored some species over others, observations of species are considered crude indices of abundance. The most commonly observed species (> 5 individuals) include the ringneck snake (*Diadophis punctatus*; n = 19), eastern box turtle (*Terrapene carolina*; n = 18), ground skink (*Scincella lateralis*; n = 18), worm snake (*Carphophis amoenus*; n = 13), and American toad (*Bufo americanus*; n = 8). With the notable exception of the box turtle, these species are secretive by day and generally not encountered in numbers unless an effort is made to extricate them from their retreats.

Accounts of species observed

Salamanders

The northern slimy salamander (*Plethodon glutinosus*) was the most commonly encountered salamander. I found two adult-sized animals beneath rocks, and a subadult under bark on the ground on 27 May. One Barbour's salamander (*Ambystoma*

toma barbouri) was discovered on 25 June hiding within a pocket of moist organic matter that had accumulated beneath a small, flat rock on a 45-degree southeast slope. An adult southern two-lined salamander (*Eurycea cirrigera*) was found within a well-rotted log near a steep, rockless dry gully on 25 June. A red eft (*Notophthalmus viridescens*) was located beneath bark on the ground on 25 June.

Frogs

The most frequently encountered anuran was the American toad. American toads were found most often beneath rocks (n = 6), but also under bark on the ground (n = 1) or under logs (n = 1). Three American toads were observed on 3 June and five on 25 June. Fowler's toads (*Bufo woodhousii fowleri*) were found beneath rocks (n = 3) and logs (n = 1). One Fowler's toad was discovered on 3 June and three more were seen on 25 June. One northern cricket frog (*Acris crepitans*) was observed on 25 June about 50 m south of a man-made pond. A single subadult green frog (*Rana clamitans*) was discovered beneath a damp log on 25 June. The number of anurans increased more than twofold as a result of the pre-dawn rain on 25 June (Table 1), suggesting that anurans would have made up a greater percentage of the catch had rainfall amounts been closer to average.

Turtles

Box turtles were most often observed as they walked about on the soil surface, although several were found partially buried in unburned leaf mold. Whereas 15 box turtles were observed in May, only three were encountered in June. Box turtles are most often encountered in Indiana in April and May, and following rainfall in the summer (Minton, 1972). During hot, dry periods, box turtles migrate to streams and ponds (Minton, 1972). This probably explains the reduced numbers of box turtles in June, which was unusually hot and dry.

Lizards

Ground skinks were observed beneath bark on the ground (n = 10), beneath the bark of logs (n = 3), under logs (n = 4), and on the soil surface near a log (n = 1). The number of ground skinks observed each trip steadily increased until 25 June when suddenly the number plummeted (Table 1). According to Minton (1972), ground skinks are most often seen in May and June but are difficult to find later. Perhaps the drop in observations at the end of June is the result of the preceding ten-day heatwave.

The only other lizard species positively identified within the burn area was the five-lined skink (*Eumeces fasciatus*). All four five-lined skinks were observed on 27 May; two males beneath the bark of the same log, and two females beneath the bark of separate logs. In addition to the five-lined skinks, two other unidentified *Eumeces* were observed. These two individuals eluded capture, and thus positive identification. They could have been five-lined skinks or broadhead skinks (*Eumeces laticeps*). One *Eumeces* sp. was observed beneath the bark of a log on 27 May, and the other was discovered

Table 1. Herpetofauna observed within the area encompassed by the 18 April 1994 Mogan Ridge prescribed fire in 20 hours of searching (listed phylogenetically and alphabetically).

Species	Number of individuals observed				
	13 May	27 May	3 June	25 June	Total
<i>Ambystoma barbouri</i> (streamside salamander)	0	0	0	1	1
<i>Eurycea cirrigera</i> (southern two-lined salamander)	0	0	0	1	1
<i>Notophthalmus viridescens</i> (eastern newt)	0	0	0	1	1
<i>Plethodon glutinosus</i> (northern slimy salamander)	0	3	0	0	3
<i>Acris crepitans</i> (northern cricket frog)	0	0	0	1	1
<i>Bufo americanus</i> (American toad)	0	0	3	5	8
<i>Bufo woodhousii fowleri</i> (Fowler’s toad)	0	0	1	3	4
<i>Rana clamitans</i> (green frog)	0	0	0	1	1
<i>Terrapene carolina</i> (eastern box turtle)	7	8	2	1	18
<i>Eumeces fasciatus</i> (five-lined skink)	0	4	0	0	4
<i>Eumeces</i> sp. (unidentified skink)	0	1	1	0	2
<i>Scincella lateralis</i> (ground skink)	4	5	8	1	18
<i>Agkistrodon contortrix</i> (copperhead)	1	0	0	0	1
<i>Carphophis amoenus</i> (worm snake)	1	2	3	7	13
<i>Diadophis punctatus</i> (ringneck snake)	6	8	1	4	19
<i>Storeria occipitomaculata</i> (redbelly snake)	1	0	1	0	2
Total individuals:	20	31	20	26	97
Total hours:	4.5	6.25	4.0	5.25	20
Individuals found per hour:	4.44	4.96	5.00	4.95	4.85

under bark on the ground on 3 June.

Snakes

The most commonly encountered snake was the ringneck snake. Ringneck snakes were found beneath bark on the

ground (n = 6), beneath bark on logs (n = 5) or snags (n = 1), under rocks (n = 4), beneath rotted logs (n = 2), or within rotted stumps (n = 1). On 13 May, a concentration of four ringnecks was found beneath the bark of one log. Aggregations of ringneck snakes not associated with hibernation are thought to be the result of mutual attraction to microhabitats

providing optimal environmental conditions (Dundee and Miller, 1968). The snake discovered beneath the bark of a snag was 1.2 m above the ground and preparing to shed. One snake, captured beneath a rock nearly escaped down a small mammal burrow that opened to the surface beneath the rock. Another snake captured beneath a rock disgorged a red eft (*Notophthalmus viridescens*) upon palpation. A gravid female, collected 27 May, laid seven eggs in captivity on 6 or 7 July. The clutch represented 51% of the female's postpartum body mass. More ringnecks were encountered in May ($n = 14$) than in June ($n = 5$). This may be due to migration of snakes downslope as the soil on the hillsides dried out.

Thirteen worm snakes were encountered during the survey. Worm snakes were found beneath piles of bark on the ground ($n = 4$), within the matrix of soil and decaying wood ($n = 4$), beneath rocks ($n = 4$), and under rotted logs ($n = 1$). Two females captured on 25 June were gravid. Both were held in captivity until oviposition. One snake deposited two eggs on 3 July (54% of female's postpartum body mass) and the other laid two eggs on 12 July (59% of her body mass). On 25 June I exposed two worm snakes simultaneously that had taken cover within a matrix of rotted wood and soil. The smaller snake writhed so violently when uncovered that I thought it was the tail of the larger snake, which I assumed I had chopped off with the rake. Smith (1961) noted that worm snakes seek moist microhabitats as the ground dries in the summer. This may explain why increasing numbers of worm snakes were observed as the survey progressed (Table 1).

Two redbelly snakes (*Storeria occipitomaculata*) were encountered during the survey, one on 13 May and the other on 3 June 1994. Palpation of the snake captured on 3 June revealed that it was gravid. The snake was retained in captivity until it gave birth to 11 young during the week of 26-31 July. The combined weight of all the young represented 53% of the female's body mass.

One copperhead (*Agkistrodon contortrix*) was observed on 13 May 1994. The snake was found lying within a small mammal burrow constructed beneath a flat rock lying at a 45 degree angle on a southwest slope. Copperheads in Indiana have a short activity period (Minton, 1972). Due to the relatively early capture date, it is likely that this snake hibernated in close vicinity to its capture point.

Catch per unit effort

The catch per unit effort (CPUE) per trip varied from 4.44 to 5.00 individuals per hour (mean = 4.85). It is difficult to assess CPUE since I am unaware of comparative data for the habitat type sampled. The timed searches conducted by Ewert et al. (1993) were confined to intermittent streambeds. There is reason to believe, however, that the CPUE was inflated by the fire. The fire exposed numerous small mammal burrows and openings to subterranean tunnels which are normally hidden beneath the leaf litter. When covered with leaf litter, these tunnels provide small herpetofauna with cover. In addition, the reduction of leaf litter coverage could have increased the CPUE of some secretive species that may have concentrated under remaining cover. A number of secretive species

encountered, including one of the most frequently observed (ground skink), are often found in the leaf litter (pers. obs.). The lack of leaf litter may also have increased the sighting rate of box turtles, since they visually stood out against the blackened soil.

Species not observed

The Mogan Ridge burn includes the range of a number of reptiles that were expected, but not observed. These include the fence lizard (*Sceloporus undulatus*), broadhead skink, black racer (*Coluber constrictor*), black rat snake (*Elaphe obsoleta*), eastern hognose snake (*Heterodon platirhinos*), black kingsnake (*Lampropeltis getula*), milk snake (*Lampropeltis triangulum*), rough green snake (*Opheodrys aestivus*), smooth earth snake (*Virginia valeriae*), brown snake (*Storeria dekayi*), and timber rattlesnake.

Broadhead skinks may have been observed but unidentified since they escaped capture. The absence of fence lizards was particularly surprising since several were observed on FR 1011 before entering the study area. The canopy of the study area at the present time is essentially closed. Fence lizards prefer open oak-hickory forests (Minton, 1972), and may be expected to become more prevalent should the canopy open as a result of repeated fires. Black racers, milk snakes, green snakes, and earth snakes also prefer forests having a relatively open canopy, as well as forest openings (Minton, 1972). According to Minton (1972) the peak of seasonal abundance for the black rat snake in Indiana is during the months of May and June. Minton also states that black rat snakes inhabit forested uplands. However, during the bird nesting season, black rat snakes exhibit a preference for fields and field/forest ecotones (Weatherhead and Charland, 1985) which could account for their absence during this survey. Hognose snakes prefer open, dry habitats, and are only occasionally collected on wooded slopes (Minton, 1972). Although brown snakes can be found in a number of habitats in Indiana, they exhibit a preference for "open, grassy country" (Minton, 1972). The ability of timber rattlesnakes to disappear amid leaf litter is legendary. Telemetry studies have shown that timber rattlesnakes are sit-and-wait predators, typically coiling in leaf litter near a fallen log (Reinert et al., 1984; Sealy, 1994). Since I avoided unburned areas where leaf litter still covered the ground, I may have inadvertently overlooked any rattlesnake inhabiting the burn area.

Conclusions and research recommendations

No direct mortality of amphibians or reptiles attributable to the fire was observed. This could be the result of initiating the survey three weeks after the fire, during which time herps killed by the fire may have decomposed or been scavenged. Mortality may also have been kept to a minimum by the slow movement of the fire and that the fact much of it burned at night. In addition, most species of amphibians and reptiles observed during this survey are secretive and inhabit moist microhabitats, and are thus not likely to be killed by fire.

With the exception of amphibians, herpetofaunal diversity did not seem unusually depauperate nor did the numbers of

individuals observed seem low for the habitat investigated and methods used. Amphibians were probably under-represented as a result of drought.

In his summary of the biology of the timber rattlesnake, Brown (1993) cites several reports of den deterioration and basking site elimination due to successional closure of the overstory canopy. Open-canopied forests allow more solar radiation to reach the forest floor, resulting in a greater growth of groundcover vegetation (pers. obs.). Increased forage production at ground level creates favorable conditions for rodents and rabbits (Ahlgren, 1966; Hill, 1981), important prey of the timber rattlesnake (Keenlyne, 1972, and references within).

Long-term studies comparing pre- and post-burn herpetofaunal communities are required to accurately assess the affect of prescribed fire on amphibians and reptiles. In addition to timed searches, other quantitative techniques such as trapping in association with drift fences are needed. Since long-term studies are costly, comparing the herpetofauna of similar burned and unburned areas would provide comparable data. Drift fence trapping, used in conjunction with baited traps, can also provide data regarding small mammal abundance. Small mammal abundance data may provide an indirect means of assessing habitat quality for timber rattlesnakes.

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A Few Lessons from Herp Survey Work

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Several months ago in the *Bulletin*, Aaron Bauer and I published the results of three year's worth of field work in Nottingham County Park, Pennsylvania (Bauer and Witwer, 1995). The goal of this continuing project is to inventory the amphibian and reptile species present in the park. Survey information like this is useful for public education in the park itself, as well as for broader biological purposes (e.g., conservation decisions). In our paper, we encourage regional herpetological groups to pursue this sort of project in their own areas. Many parks and natural areas in or near population centers probably contain substantial numbers of herp species, but have not been thoroughly surveyed.

This article is not a discussion of survey work per se. Instead, I want to share a few observations which I think CHS members doing (or considering) similar work might find interesting.

The More Often the Better

In a species inventory, one wants to discover every herp species that lives in the study area. Since these animals are so secretive, and are active at different times of year and in different sorts of weather, a survey based on only one or a few days of searching is not likely to be complete (Karns, 1986). The more often one can visit the study area during the active season, the better. On 29 May 1994, I discovered two longtail salamanders (*Eurycea l. longicauda*) under the same stone on a moist bank. At that time, this was our only record for this salamander in the park, although Warny (1985) had reported it from the area. Returning to the same slope earlier in the spring of this year (17 April 1995), I found no longtail salamanders despite extensive searching. I did however find numerous northern slimy salamanders (*Plethodon glutinosus*): a species which had not been previously reported from the park. A few weeks may make a difference in what you find. This is particularly true for breeding amphibians, of course. The only records we have for northern spring peepers (*Pseudacris c. crucifer*) and wood frogs (*Rana sylvatica*) are during their breeding seasons.

It may also pay to visit the same spot, at the same time of year, in different years. On 24 March 1991, we collected a mass of eggs (assumed to be wood frog eggs) from a vernal pond, and Aaron Bauer heard a wood frog call from a wet area nearby. We did not find the calling frog. Last spring I was determined to verify the species' presence in the park, and to collect a voucher specimen. It was a very severe winter in our area, with prolonged subfreezing temperatures and late snowfall. Early in spring, I started checking the vernal pond. These frogs breed very early, even in water with ice on it (Shaffer, 1991), and don't remain at the breeding site long. I didn't want to miss them. Visits on 3/12, 3/15, 3/24 (by Aaron Bauer and a student), and 3/29 turned up no sign of wood frogs. The spring peepers were in chorus by 3/29,

which I generally take as an indicator that the wood frogs are past due. With the problems amphibians are having worldwide, I was afraid that the population in the park was gone. This spring, after a mild winter, I visited the park early (12 March 1995) to check on amphibian activity. Hearing spring peepers at the vernal pond, I went over to investigate. On emerging from the brush by the pond, I was surprised to see five egg masses in the water! Spring peepers don't lay eggs in masses. Further searching turned up several adult wood frogs in the water. Apparently this small population is alive and well but did not breed after the severe winter last year. This was a new one to me, but it is not unheard-of in amphibians at higher latitudes (Aaron Bauer, pers. com.). If our survey work had been limited to 1994, we would probably have missed this species.

Good Things in Small Places

I have learned not to overlook small places. Nottingham Park encompasses about 650 acres, and within that area are numerous small and distinct habitats. For example, the vernal pond mentioned above consists of a shallow pool of perhaps 4 square meters and another perhaps 28 square meter wet area of emergent grasses and other vegetation. This is a small pond! It is also the only one like it that I know of in the park. Despite this, it is a breeding site for spring peepers, the only spot (to our knowledge) in which wood frogs breed successfully, and the only place in the park where we have found spotted turtles (*Clemmys guttata*) two specimens: one in 1991 and another individual in 1995).

A second example involves the northern black racer (*Coluber c. constrictor*). Warny (1985) reported this species from the park area, but we had never seen one. This spring (17 April 1995) I stumbled onto a fairly small area of distinct vegetation, in which I saw three specimens and heard what I assume were two more fleeing through the undergrowth. It was a bit difficult to reach this area, but it was obviously worth the effort. I wonder if other small, herp-rich spots are hidden in areas of the park which I have not gone to the trouble (and pain: much of the undergrowth is briars!) to find.

Two for One

Generally speaking, herps are not social animals. However, it is not uncommon to find two or more in the same location. There are a number of reasons why this might be true at different times and with different species. The most generic explanation is that a microhabitat (hiding place, basking spot, hibernaculum, etc.) which is suitable for one herp is likely to be just as good for some other. If territorial behavior doesn't exclude more than one individual from using the site, it makes sense that more than one might.

I am learning to look around carefully after spotting one

herp; at times I find another. On 22 May 1994, I was standing behind a tangle of vegetation at the edge of a stream in the park. To one side of me I spotted an eastern ribbon snake (*Thamnophis s. sauritus*) resting on the brush about 1.5 m above the water. Scanning some more, I found a second ribbon snake on my other side. It was about 3 m from the first one, also resting on the vegetation at the same height above the water. On 12 April 1995, I investigated a site where a park official had previously reported seeing two black rat snakes (*Elaphe o. obsoleta*). Sure enough, I found both basking about 2 m apart. Four of the five black racers mentioned above were also discovered close to another specimen. One that I heard slip into the undergrowth did so about 10 m from an individual that I had found basking in the open. A bit further on I saw another racer retreat into the thicket. I stopped long enough to write the record down. When I looked up and just beyond me, there was another large specimen basking on a small bent oak tree, about 2 m above the ground. In a different area of the park that same afternoon, I saw a large northern water snake (*Nerodia s. sipedon*) basking. I crept close for a better look. The water snake fled, but I noticed something right next to where it had been lying. Almost invisible under vegetation and pine needles was a large coiled black rat snake. The two snakes may have been touching, they were so close. Apparently neither snake minded sharing a good basking site

with the other, and I got two records for the effort of one.

Write it Down

I will conclude by observing that I would not have remembered the details of these events in the park, if I had not written them in a field journal. Taking the time to record things can be a nuisance, but it pays off. I have sometimes been embarrassed at what I failed to write down and did not remember later. Good, detailed notes are a *must*, our data is to be available and useful to others. In his field guide, Stebbins (1966) describes a good model for field notes. I scribble data (date, time, location, temperature, wind, cloud cover, species seen and/or collected, etc.) on 3×5 cards, which I carry in the field; I transfer the information to a journal later. It has probably been the discipline of doing this survey which has made a habit of this for me.

I encourage anyone interested in herps to keep a journal. Your observations in the field, or of your captive animals, can be useful to the rest of us. Submitting them to publications like this one helps us all.

Acknowledgments

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Book Review: *A Field Guide to Reptiles and the Law* by John P. Levell. 1995. Serpent's Tale, Excelsior, MN. Softbound. 240 pp. ISBN 1-885209-03-7. [Available from the CHS Book Service]

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Recently I received a flyer in the mail from the newly formed **National Herpetological Alliance** (NHA) (P.O. Box 5143, Chicago, IL, 60680-5143, USA). It was titled "Imagine a World Where Herpetology and Herpetoculture Are Criminal Offenses." The flyer then reads, "Herpetology and herpetoculture are under assault at the federal, state and local levels,

oftentimes from a misinformed public and many times from radical animal rights organizations. . . ."

The rest of the flyer then describes the NHA, what it stands for and how it intends protecting herpetology, herpetoculture and reptiles themselves in the long term. Those who think that the views put forward by the NHA are a little on the radical

side will (should) be quickly silenced following a brief perusal of *A Field Guide to Reptiles and the Law*.

That book takes 240 pages to do little more than provide a basic summary of current (as of February 27, 1995), laws affecting U.S. herpetology and herpetoculture. Furthermore the book only covers laws at the state and federal levels. The minefield of local laws is simply put into the “too-hard” basket. There are of course hundreds if not thousands of local governments which are also out there enforcing their own herpetology-related laws and in many cases simply seeking their own pound of flesh from reptile and amphibian people. To put all local laws affecting reptiles and amphibians into a single publication would probably fill several volumes.

Referring back to the NHA leaflet, it is clear that if it isn't already a criminal offense to be a herpetologist in the United States, in many parts of the country such a state of affairs is getting dangerously close. Levell's book attempts to guide the reader through the minefield of federal and state regulations affecting reptiles and amphibians. Although he has attempted to provide a user-friendly guide and has succeeded, it is clearly possible for a well-intentioned individual to fall foul of laws even after following the guidelines in the book. To his credit, Levell makes this clear on the second page.

The book describes a plethora of regulations which restrict the capture and keeping of herptiles. Many of these laws would no doubt be unfamiliar to many readers who are in theory affected by them. Levell's book not only serves to make it easier for well-intentioned readers to comply with various licensing laws and so on, but also aids the enforcement agencies themselves (in theory), by increasing compliance with these laws. Levell's comment that “Simply put, it's impossible to obey laws which are unknown” is certainly true.

The format of the book is as follows:

After the obligatory Contents, Preface and Acknowledgements, is an Introduction which starts with a useful section titled “How to Use This Book.” The main body of the book then details (in summary form), CITES, federal regulations, and then state laws, with the states covered in alphabetical order. The book is set up in a manner whereby it is easy to locate information relevant to the reader. At the rear of the book is an Appendix listing addresses of government regulatory agencies and then another Appendix listing state-protected reptiles and amphibians by species name (scientific name only) and the states in which they are “protected.” The book closes with a three-page Bibliography.

Levell makes the useful comment that laws change so often that it is imperative for those affected by them to make contact with the relevant agencies to be aware of the most recent (current) regulations and how to comply with them, on a regular basis and whenever there is risk of breaching laws. His comment that the material in the book will date quickly is accurate, as the rate of change for most herpetology-related laws is increasing, not decreasing. This is likely to continue.

An example of this scenario can be seen in Australia, where John Weigel sought and got from NPWS/NSW the most up-to-

date laws relating to reptiles for inclusion in his book *Care of Australian Reptiles in Captivity*, published in 1988. The laws were out of date even before the book was printed! No doubt some of the state laws listed in Levell's book would have changed before the printer's ink dried on the printed pages.

In preparation of the book, Levell sought and got cooperation from most law enforcement agencies. This is to their credit. Some however did not cooperate and Levell noted this at the beginning of the book. I believe he should have taken the next step and named these departments as a warning to readers who may also have to deal with them. Perhaps he can do this in later editions.

Another criticism is the bibliography which I thought could have been extended to include other relevant entries. This I find is a common problem with many books published in the United States.

Another thing I thought could have been added to Levell's book would be chapters discussing “protection” laws for reptiles and amphibians. These laws which are more appropriately called “licensing laws” do not always work in the interests of the species targeted and a discussion of these laws, in particular some of the many counterproductive ones would have been useful. This topic is however a can of worms and could easily fill a book in itself. This probably explains why Levell apparently chose to ignore the topic.

A final minor criticism is with the photos included in the book, including on the front and rear covers. While the photographers are acknowledged, caption information isn't always given (or at least I couldn't locate it). This I find, devalues the photos' usefulness.

Notwithstanding my criticisms, the book is useful to most herpetologists and herpetoculturists in the United States, particularly those who maintain relatively large collections and/or buy and sell animals on a regular basis. The cost of the book is relatively cheap when compared with what would be experienced in the event of being charged with wildlife offense/s by a law enforcement agency. To be forewarned is to be forearmed and on that basis I suggest that many reptile and amphibian people in the United States should assign a relatively high priority to buying this book.

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NEWTLINE

The lobby of the Field Museum looked like a petting zoo swarming with inquisitive children and their parents for the June 28, 1995,

"Show & Tell" meeting of the Chicago Herpetological Society. Touted as "one of the favorites among the kids," this meeting is oftentimes avoided by the "regulars." This is too bad. Seeing the expressions on the faces of the young herpetologists makes it all worthwhile. This meeting reminds me of the fun I had showing off my first amphibian to my friends and relatives. One of the many admirable goals of the CHS is to spark interest and continue education in the field of herpetology. What better way than to encourage the very young and young at heart. While certainly not as large or as popular as previous shows such as our CHS Expos or Herpetological Weekends at the Academy of Sciences, this is a good way for young exhibitors to "get their feet wet."

Those exhibitors too intimidated or shy to make a formal stage presentation, instead assembled their displays at tables set up in the lobby. Among the lobby exhibitors was nine-year-old **Ryan Connolly** smiling proudly as did his White's treefrog, barking treefrog and firebelly toad. **Tom Flanagan**, age 14, and **Craig Schnibben**, age 16, also brought White's treefrogs they had adopted as part of a growing contest at this year's Expo. Pausing for a second to remember her age, eight-year-old **Maureen Wille** brought a Cuban tree frog and an American toad. Seeing "regular" **Aaron Ruther**, it was hard to believe he is already 12 years old. He showed off his American toad and a leopard gecko. **Dillon Halzle**, age 12, answered questions about his two Dumeril's boas and a ball python. **Becky Chan**, age 8, was just as adorable as her two anoles. Fourteen-year-old **Steven Schoenfeld** brought in his African Bell's hingeback tortoise. Remarkably, the tortoise is as old as Steven.



The "young at heart" exhibitors included **Mike Cibura**, who fielded questions about his juvenile Savannah monitor. **Matt Pedersen** held an even younger (two-month-old) Savannah monitor perched on his index finger. **Nicole Marrello** and **Chris Lechowicz** brought a wide assortment of herps that included a barred and eastern tiger salamanders, a wood turtle, an Ernst map turtle, a black-knobbed map turtle and a green iguana that was hiding in a cardboard box. **Mike Scott** brought two northern water snakes and a ball python. A tiny harness with a leash attached held **Karen Bielski's** water dragon firmly within reach. **Mike Fletcher** brought his whip-tail lizards and **Jim McDermott** presented his tropical wood turtle and an ameiva lizard (also known as a "jungle runner"). **Diane Brinskelle** brought in her monkey-tailed skink she thought had a broken toe in hopes of speaking to a vet. Helping librarian **Renee Gralewski** check out books to members was her 4-foot female boa constrictor "Zic," along with its complete shed skin. **Mary Adamczyk** held "Cooper", a green iguana and suggested that anyone interested in learning more about green iguanas contact pet host Melissa Kaplan through America Online's bulletin board.

With barely enough room to move, visitors gathered into the A. Montgomery Ward Lecture Hall for the business portion of the meeting. President **Marcia Rybak** asked us to fill in the empty seats to accommodate the "standing room only" crowd. She also requested that visitors remain in designated lobby areas, and avoid wandering throughout the museum. Membership secretary John Driscoll was out ill so **Char Haguewood** filled in for him by signing up new members. Merchandiser **Joan Moore** announced excellent discounts to members on books like **Archie Carr's Handbook of Turtles** and *A Field Guide to Reptiles and the Law* by long-time CHS member **John Levell**. She noted that the guide book was an excellent reference, "Although," she remarked, "the problem with this is, with the everchanging legislation, these types of books are already out of date by the time they go to press." However, she pointed out that the book contains the names and addresses of those individuals and agencies to contact should any regulations change. She suggested we purchase a copy and corner John for an autograph at the upcoming Midwest Herpetological Symposium. [Newt congratulates John on his publication and hopes he will serve as an inspirational example



Newt 95-

of the significant contributions CHS members can make to the field of herpetology.] As we broke for the intermission, **Ron Humbert** asked that those who had not signed up to speak for the evening to please see him in the lobby.

Following the raffle conducted by **Dave Beamer**, the highlight of the evening had finally arrived. Ron Humbert set up some ground rules. He asked that while waiting to speak, members keep the animals confined within their seating area. He also reminded speakers to speak slowly and clearly and to limit their presentation to three minutes (allowing time for questions) or he would “hook” them off stage. He also set some rules for the audience. He reminded us: “Some people fear public speaking worse than death, so please be polite and attentive.” He also requested that in order to keep the process moving quickly, we hold all applause until the end of the evening.

First up to the podium was **Marcia Rybak**. She opened a plastic traveling case to reveal a one-year-old female imported frilled dragon. At home, she keeps it in a large cage with vertical branches: “They like to be able to see around the branches.” The lizard only eats when hand fed. Marcia hopes to breed her and noted that the frilled dragon is an egg-laying species. As a double treat, she held up a spectacular veiled chameleon. The male is housed in a rabbit cage in a room heated to around 80 degrees with 50% relative humidity. She feeds him crickets with “pinched-off” legs. We learned that chameleons don’t drink standing water and must have a drip system.

Next Ron Humbert introduced **John Koska** and his son, **Gary**, with a large garter snake named “Blackie.” They were unsure whether it was *Thamnophis sirtalis* or *Thamnophis radix* and welcomed a debate. They purchased the snake from an unnamed pet store that suggested it be fed a diet of goldfish. Shortly, they discovered blood in its stool and had it de-parasitized. After reading the CHS *Care in Captivity* booklet, they decided to “scent” mice and were quite successful. It now eats a mouse every two weeks.

Audrey Vanderlinden was up next to present her male ornate uromastix lizard, “Tut,” named after its native Egypt. Remarked Audrey, “This is the most enjoyable of all my lizards because they are so active.” She explained that they were herbivores and liked the temperature very hot. She described him as looking like “a shelled turtle.”

“Spot”, a Nile monitor, escorted **Perry Ross** to the podium. Named after the creature from the Addams Family, “Spot will eat almost anything he can overpower.” Totally carnivorous, the creature is fed chicken gizzards, rabbits and mice. In their native habitat they can grow to seven feet, and are known to eat crocodile eggs. He keeps Spot in a Neodesha cage, but did not recommend a Nile monitor as a pet.

Next was **Bob Ruzicka** and his crayfish frog which was about as big as his thumbnail. The frog had just transformed from a tadpole three days earlier. He adopted the tadpole at this year’s CHS Salamander Safari as part of the frog growing contest. He explained that it was from southern Illinois and knew that it was a male, “because of its yellow markings and

dorsolateral ridges.” He keeps the frog in an aquarium with water, logs and grass.

Gary Ruther held up “Buford,” an American toad that he believes worked for the city of Chicago because he found him in a city park nine years ago. He was told by a vet that Buford was an old toad. He explained that his family had been bringing Buford to CHS Show & Tell for many years and it was finally his turn. Gary has been studying Buford intensively over the many years and has observed that he exhibits three basic behavior patterns, “He sits on the dirt, or he sits on a rock, or he sits in the water. . . .”

Ilene Sievert held up a male eastern box turtle named after CHS member **Tom Anton**. Tom collected the turtle in LaSalle County and he hopes it represents a record for that area. She described the turtle as having an outgoing personality and a “bull-dozer” who searches for sow bugs, millipedes and earthworms in mulch. Despite several healed over wounds, its shell and legs had brilliant orange markings. Ilene knows that it is a male because it has red eyes. She is hoping that Tom will let her keep Tom.

Youngster **Dillon Halzle** brought his one-year-old, 3-foot-long ball python up to the podium. The rather docile python was most unusual with yellow markings. He keeps it in a 30-gallon aquarium and says it is very friendly. He purchased the snake from a local swap meet. He feeds it small dead rats once a week and, so far, he reports, the snake has never refused food.

Keith Johnson showed us his female Reeves’ turtle. He explains that in Japan they live in rice paddies and “the water helps them to digest their food.” He has kept her for 20 years and she has laid several infertile eggs over the years.

Mark Papiernik brought “Ricky”, a male red-footed tortoise he has kept for 15 years, feeding it on fruit and greens. He keeps it in a large wooden cage with a temperature of 85 degrees during the day. He explained that he fights with other males and makes clucking and grunting sounds during mating.

Julia Howard showed us her albino male Burmese python from Malaysia. She explained that he was fed live food as a juvenile and had become quite aggressive, biting two co-habiting boas, and even biting her once. She was excited since this was her first time showing the animal in public.

Scott Michaels showed us a beautiful 4-year-old Tarahumara mountain kingsnake originally from the mountains in northern Mexico. He explained that she eats 2–3 pre-killed mice once per week and he feels it is important to hibernate this snake from October to March in temperatures around 40 degrees. They breed in spring, laying 3–5 eggs which hatch in 50–60 days. He apologized to lizard owners, stating that in the wild, lizard is a favorite meal. Astonishingly, retail cost for this animal could be as high as \$1,000. Scott noted that this kingsnake is nonvenomous, but is similar in color pattern to the venomous coral snake. He reminded us of the rhyme, “Red touch yellow — kill a fellow; Red touch black — friend of Jack.”

Nicole Marrello brought "Jobe," a small three-year old green iguana she adopted one year ago, at which time it was suffering from metabolic bone disease. It had been treated with injections and was on its way to recovery. She feeds it high calcium foods like mustard, turnip and collard greens. Regarding myths of feeding iguanas spaghetti and mice, she noted that "Kids like candy, but you don't give it to 'em all the time." She explained that it likes to sunbathe—floating on a raft in the water (no chlorine of course).

Young herper **Matt O'Connor** held his grey treefrog he had mercifully rescued from some boys who had buried it alive at a Boy Scout outing. [Hopefully, burying animals alive is not a skill most Boy Scouts are learning.] He feeds it crickets and keeps it in a 30-gallon cage with a temperature of around 70 degrees. It was no problem seeing the healthy frog from the audience because it jumped repeatedly off the podium, off Matt's finger, off the cage into the air, and even onto the visitors laps seated in the first row.

Showing off her attempt at successful breeding, Joan Moore presented her Kenyan sand boa which was due to give birth at any time. She stressed the importance of keeping accurate husbandry records. She suggested keeping a record or "Bible"

on index cards near the cage. She also brought in a failure, a year-old baby snake which weighed less than its birth weight. Since it will not take food on its own, sadly, she has to cut a tail off an adult mouse and force it down the snake's throat.

The final presenter was **Pam Degregorio** with "Eloise", a five-year-old, 20-pound African spur-thighed tortoise, so named for the conelike spurs on its legs. This species of tortoise is among the largest and most powerful. In the winter, she keeps it inside in a large wooden child's playpen. Currently, it lives outside in her yard where it basks on the patio, moves heavy patio furniture and grazes all day on grass and dandelions. She says it gets along fine with her cat and dog and even begs for dog biscuits. She joked that it occasionally eats dog "turds" as well. It drinks water from a bowl and she allows it to wade in a shallow "kiddie" pool, but notes that it can't swim. "With a longevity of approximately 50-60 years," Pam worries, "I'll have to put her in my will."

After thunderous applause, Ron thanked all the exhibitors and presenters stating, "I can't wait to do it again next year."

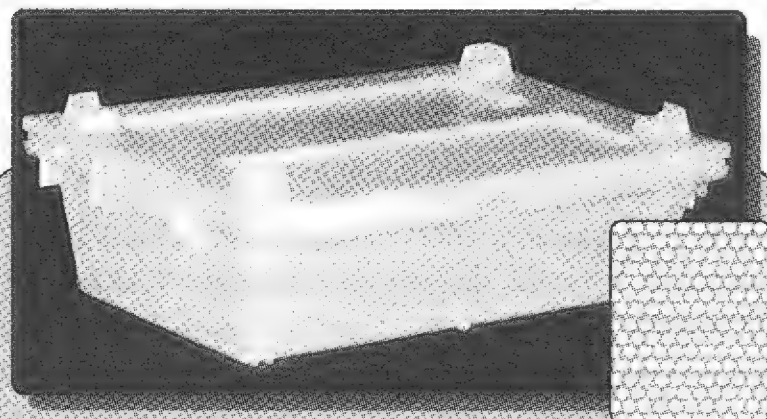
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HerPET-POURRI

by Ellin Beltz

2MB of pain

- In what was headlined “the worst snake bite in U.S. history,” 51-year-old George VanHorn of the Reptile World Serpentarium in St. Cloud, Florida, was envenomated by a 12-foot king cobra during a snake-handling exhibition, while 30 children from a day-care field trip watched. The day-care owner said, “[VanHorn] was getting . . . ready for the next snake. . . . [The cobra] popped its head up, looked around the room . . . fanned out its little head . . . and struck about eight feet parallel across the room.” He added that at first the children had no idea that the strike was not part of the show, but later became concerned and frightened when the severity of the event became apparent. VanHorn reportedly stayed cool. He walked into the next room and injected himself with epinephrine, a substance similar to adrenaline, which was to counteract some of the immediate effects of the envenomation. Then he and his assistant, Bonnie Watkins, went to the hospital. Watkins has worked at the serpentarium since 1972 and was present when the bite occurred. They took a multidose vial of tiger snake antivenin (the closest they had to cobra) to the hospital, where VanHorn was listed in very critical condition. Antivenin from many sources began arriving in Florida quickly. VanHorn is well known and respected; his serpentarium supplies venom for medical research and the production of antivenin. Three days after the bite, he was conscious and speaking to reporters. “I didn’t feel any fear,” VanHorn said, “but I didn’t think I was going to live. I really wasn’t ready to die.” He recalled the event: “The box opened, and he just came out like an arrow. It just came straight across. He saw my hand as a food item, and he just grabbed it as fast as he could.” VanHorn plans to return to his serpentarium as soon as the doctors permit it. Watkins, incidentally, returned to Reptile World while VanHorn was still unconscious, captured the cobra which was loose in the hot room, and returned it to its cage by herself. [Orlando, FL *Sentinel*, June 22, 23, 24, 25, and 26, 1995, from Bill Burnett]

- An 8-year-old boy was bitten by a rattlesnake at home on the couch in his living room in Brownwood, Texas—120 miles southwest of Fort Worth. The family home had been plagued by scorpions and the family was just bedding down for the night in the living room because all the bedrooms had been sprayed with insecticide that day. The boy felt a bite, but couldn’t find the scorpion. A rattlesnake was found rolled up in a blanket on the floor by the boy’s mother. The father killed the snake and the family called for help. Then they drove to the highway to meet the ambulance (which is a good tip if you’re ever far from the main road) and the boy was taken to a hospital and listed in fair condition. [Albuquerque, NM *Tribune*, June 23, 1995, from J. N. Stuart]

More from the Internet

- *Herpetological Review* is now on-line: A pre-publication listing of the contents of each issue of *HR* is now available from several on line sources: Herp-Net (215) 464-3562 (300–

2400 bps 8-N-1) or (215) 698-1905 (9600, 14.4 kbs) 24 hours. Selection “Herp.Review” menu item . . . Usenet newsgroup “sci.bio.herp” . . . Herpetology World Wide Web at Harvard “http://xta1200.harvard.edu:8000/herp” . . . CompuServe Animal Forum [Go Petstwo] reptile/amphibian library section 6. Search for keyword “SSAR” . . . America Online, under “pet” section, search reptile files. This service is made possible by Mark Miller and the Herpetology On-Line Network [mmiller@tjuvm.tju.edu]. SSAR also has a World Wide Web Page “http://falcon.cc.ukans.edu/~gpisani/SSAR.html” or contact George Pisani directly [gpisani@falcon.cc.ukans.edu]. [from Bob Hansen]

- For dino nuts, there is a series of marvelous graphics on the Royal Tyrrell Museum website [http://www.cuug.ab.ca:8001/VT/tyrrell/].

- The Utah Association of Herpetologists can be reached by writing herpbooks@aol.com. They are having meetings at the University of Utah. Miriam Benabib spoke on the life history and ecology of *Sceloporus variabilis* at the July meeting.

- Frank Hensley of the Department of Zoology, Duke University [fhensley@acpub.duke.edu], posted a request for information: “I read in the newspaper that Kurds in northern Iraq are suffering a ‘plague of yellow vipers’ and that several people have been killed. Does anyone know any details about this? What species are they talking about? Supposedly this ‘plague’ is due to a mild winter.”

- “The editor of the *Journal of the Northern Ohio Association of Herpetologists* would like to make a formal call for papers. J. NOAH is published twice per year and contains papers on a wide variety of topics within herpetology and herpetoculture. Papers can be based upon original data or summary of other works. Field notes are acceptable, as are husbandry notes on a specific species or group. Topics need not be limited to herps found in Ohio, or the U.S. International authors are encouraged to submit manuscripts. Anyone interested in submitting a manuscript to J. NOAH can contact the editor for complete author guidelines and more information. Gregory J. Watkins-Colwell.” [e-mail: Gjwc@aol.com]

- “I am working on a project in Puerto Rico and need to address the likelihood of the presence of the Puerto Rican Boa in an area about 15 miles southwest of San Juan. I have some very general info on the habitat requirements and life history of this snake but would like some more comprehensive information. can someone either send me, or direct me to some information that may be helpful to me? Thank you much! Dane Gavin Pehrman, Project Manager/Ecologist [DaneGP@aol.com], Black and Veatch Waste Science Inc. The Curtis Center #705, 601 Walnut Street, Philadelphia, PA 19106, (215) 928-2203.”

- “The 22nd Annual meeting of the Kansas Herpetological Society will be held 4–5 November 1995, at the Natural History Museum, University of Kansas, Lawrence. All interested persons are welcome to attend and/or submit proposals for

presenting papers at the meeting. For more information, contact: David Reber, President, KHS, 1097 East 1400 Road, Lawrence, KS 66046-9633, (913) 843-2205 or fax (913) 865-5873. E-mail: DREBER@kuhub.cc.ukans.edu”

Herp-travel

- The Pantanal of Brazil was featured in the June 1995 *Chicago Life*. This area of Brazil is “one of the rare places in the world that remains unsullied by man, . . . a freshwater wetland that covers 54,000 square miles, . . . home to 600 species of birds, 90 different mammals, 50 species of reptiles, and 280 species of fish. . . . Rumors abound about the anaconda that ate a whole caiman. . . . The Caiman Ecological Reserve consists of five lodges, each miles apart. . . . Knowledgeable guides. . . . Casual yet sumptuous dinners are prepared by families from the area. . . . One of the area’s massive cattle ranches has incorporated high-end ecotourism into the operation with reportedly profitable results.”
- Upper Michigan’s famed Isle Royale is home to only a few herp species, including the chorus frog which was featured in the April 1993 issue of *Natural History*. My husband and I recently visited Copper Harbor, the gateway to Isle Royale. While the number of species is far less than in a tropical paradise like Brazil, the seclusion of the area and its remove from the cares and troubles of “civilization” make it an excellent destination for natural history lovers either alone or on the way to Isle Royale.
- The Mayan pyramid of Kukulcan at Chichen Itzá has long been a popular destination for tourists at any time of the year. A recent article in the journal *Conscious Choice* [May/June 1995] reports that the spring and fall equinoxes reveal a herpetological feature on the pyramid. On that day, the setting sun forms a shadow image of the sacred feathered serpent. The shadow slowly slithers down one of the pyramid’s edges and connects with a statue of a serpent’s head at the base of the pyramid.
- A man in Lanark County (Ontario, Canada) measures spring by snakes, too. According to an article by his wife, he “waits for a clear day when the sun actually feels as if it is getting closer to the earth; when he can walk in the fields and see rocks protruding from the melting circles of snow. On this precise day, he always finds a black snake curled up on top of a big, flat, smooth rock soaking in the warmth of the sun. Apparently the first time he saw a black snake doing this, it looked so appealing he found his own boulder to sit on and decided that the snake was really on to something. The next spring he decided boulder-sitting went better with a beer and a new rite of spring was born.” [Kingston *Whig-Standard*, March 30, 1995, from Herp Haven] I’m not sure you could get a travel agent to book you a rock in that field, but this does sound rather a nice way to pass an afternoon.
- A snake restaurant in Hanoi, Vietnam, was featured in a clipping from the Albuquerque, NM *Journal*, February 26, 1995, sent by J. N. Stuart. The reporter was traveling with a group of Vietnam veterans and was taken to the small restaurant by a local resident. “The restaurant owner . . . lifts a

square lid . . . sticks his arm down into a hole and comes up with a 5-foot cobra . . . very alive. . . . [He puts that one back and] fishes around a bit more, and this time produces a cobra that—honest to God—is 12 feet if it’s an inch. . . . [After being told of the 16 different methods of cooking snake they] have six of them—minced and grilled, steamed in a light oil with veggies, shaved snake in rice soup, barbecued snake, snake spring rolls . . . and finally, stuffed barbecued snake skin. . . . On the table are several bottles of a cloudy, colorless liquid. In the bottom of each, a pile of gray, flesh material is stacked two or three inches. Hoang Cong Thuy pulls the cork from a bottle and pours a small glass. ‘What is that?’ I ask. ‘Snake wine,’ he says. ‘What’s that piled up in the bottom of the bottle?’ I ask. ‘Reproductive organs . . . very good for you. You should try some.’” Another writer published a similar story in the *Christian Science Monitor*, March 30, 1995. He reports that about 40 snake restaurants are clustered in a few villages around Hanoi. The one he visited has been in business for four generations. The owner’s motorcycle has a sticker reading “Snake is our tradition.” [from Jim and Kathy Bricker]

- The Panyu Snake Park in Guangzhou, China, known as the Flying Dragon World Amusement Park bills itself as the first super amusement park in the world based on a snake theme. After 29 months of preparation at a cost of \$107 million, the snake park opened to the public early this year. It is expected to bring in \$355 million from overseas tourism alone in 1995 and more than \$1.2 billion by the end of 1996. The Snake Garden features “28 million snakes in 256 species.” The restaurant offers an “All-Snake Feast . . . a comprehensive example of traditional snake meals of the Guangdong [Province].” [South China Business Weekly, March 13, 1995, from P. L. Beltz]

- Closer to home, “Environmental Ed-Ventures” are available through a Carbondale outfit known as Touch of Nature. Their guides lead biweekly excursions through the swamps and bayous of the Cache River, a cypress-tupelo swamp located in far southern Illinois. [Chicago Tribune, May 7, 1995, from Steve Ragsdale]

Herps and the law

- Congratulations to long-term CHS member (and former board member) John Levell who has just published *A Field Guide to Reptiles and the Law*. The flyer for the book reads: “At last, a comprehensive listing of laws, rules and regulations by the Federal Government and all 50 states regarding both reptiles and amphibians. An essential reference for researchers, pet shops, hobbyists, collectors, animal dealers and law enforcement personnel. CITES and the U.S. Endangered Species Act explained. 50 state listings of endangered, threatened and protected species . . . collecting and possession regulations, rules regarding exotic species, permit application and more! Ask John for a personally autographed copy! 240 pages, perfect bound 8.5 by 11 inches.” It’s available from the CHS Mail Order Service.
- The Durham, NC *Herald Sun* reports that a boa constrictor stolen from a local nature center was recovered about two

weeks later by Sanford, North Carolina, detectives. Their chief said, “A concerned citizen provided us with some information. Acting on that, detectives went to a residence . . . and found the snake.” The park ranger said that when the snake was found it was in an aquarium full of ice water and added “They just didn’t know what they were doing with her.” This is the second time this snake has been stolen. The first time she was recovered at a pet shop in a nearby town. [May 30, 1995, from Joseph Zawadowski]

- A woman who was convicted in 1988 for illegal possession of six cobras, 10 rattlesnakes, and four boa constrictors has been charged with three more charges of possessing exotic animals without a permit. California Fish and Game wardens responded to a call from a Ventura police detective and removed a six-foot cobra from the home. The police had been in the process of a heroin arrest at the premises when the cobra and 19 other snakes were discovered. [Ventura County *Star*, May 15, 1995, from Harold DeLisle]

Oh, boa — more weird snake tales

- The Edmonton [Alberta, Canada] *Sun*, April 8, 1995, reports: “An apartment building caretaker had a slithery surprise yesterday when a pet python reappeared after going missing about three months ago. . . . Firefighters used a pillowcase to nab the 1.5-meter-long ‘Bert’ . . . [They] kept Bert under a heat lamp and unsuccessfully tried to feed him a hard-boiled egg. . . .” [from Roger Syriste]
- “Snake attack!” screams the headline of the Edmonton *Sun* [May 22, 1995] and is followed by a photo of a man lying on a stretcher being “wheeled away by medical personnel after being bitten in the left hand by his pet python.” A follow-up story on May 23 reported that the man was “doing OK” after being bitten by his 18-foot pet Burmese python. He was bitten while trying to take the animal out of his cage. The snake belongs to the man’s mother who was away on vacation. The man was planning to clean the cage when the bite occurred. [from Roger Syriste]
- A Chicago-area pet store owner was quoted in the *Chicago Tribune* [May 14, 1995, from Steve Ragsdale]: “We had a guy in here last night who wanted to buy a snake to keep in his toolbox. That is not the appropriate environment for a snake.”
- The Orlando, FL *Sentinel* printed a piece written by a woman who discovered a snake in her house first thing one morning: “There I stood — no caffeine in my system yet — guarding the intruder that began uncurling itself to its full four feet before my widening eyes. It started toward the foyer. I had to act! I was in charge of our fate! Bravely, I took a swipe at it but only grazed the top of its head. Enraged, it turned toward me, its mouth wide open. I jumped back in horror. . . . The snake slid into the darkness beneath my refrigerator.” She had wrenched her back when she jumped. Then her husband came in from the garage with a box and pulled out the appliance. “Once uncovered, the snake headed straight toward me. Screaming in pain and terror, I pinned it between the baseboard and floor with the broom until my hero could get around the refrigerator that separated us.” The rat snake was released

unharmd by the husband who swears he found a molted skin under the refrigerator. [by Patricia H. LaFleur, May 24, 1995, sent by Bill Burnett]

- A man went into a tavern in Hammond, Louisiana, to use the rest room about 3 A.M. one Monday and left his car running with his 9-foot python “Zeus” inside. When he came out, he noticed the car was in a different place, and a man was running away from it. The car had been damaged by being driven over a curb, but the snake was unharmed. [*Star-Ledger*, June 1, 1995 from Robert C. Danley]
- Residents in a group of condo complexes in Alameda, California, complained to authorities that a nearby vacant lot was infested with mice, spiders, mosquitos and snakes. They described the snakes as green or brown in color and said that they came slithering up the sidewalks from the empty lot. [Hayward, CA *Daily Review*, May 14, 1995 from Mike Kilby]
- A 24-year-old man was killed after he lost control of his pickup truck on a New Mexico road. His truck landed upside-down and he was thrown from the vehicle. When authorities arrived, the man’s pet snake was “wrapped around his neck but ‘had nothing to do with the accident,’” according to a police spokesperson. The man may have been fleeing from another accident scene when the crash occurred. [Albuquerque, NM *Journal*, May 1, 1995, from J. N. Stuart]
- Herb Caen, a well-known columnist for a San Francisco newspaper, reported on a publicity stunt staged in March. “The Academy of Sciences’ annual corned beef spread, picketed by the academy’s herpetologists carrying signs reading, ‘St. Patrick was a fink.’ ‘Bring back the snakes!’” [from Isadorra Jarr and Jack Fertig via internet]
- Writing in the April 14, 1995 *Sun-Times*, Chicago columnist (Ms.) Michael Sneed: “Just when you thought it was safe to go back into the water, Columbia Pics is making the river adventure ‘Anaconda,’ which has been called ‘Jaws on the Amazon.’ In it, a group of tourist schoolteachers are [sic] stalked by a killer snake.” [from Steve Ragsdale]

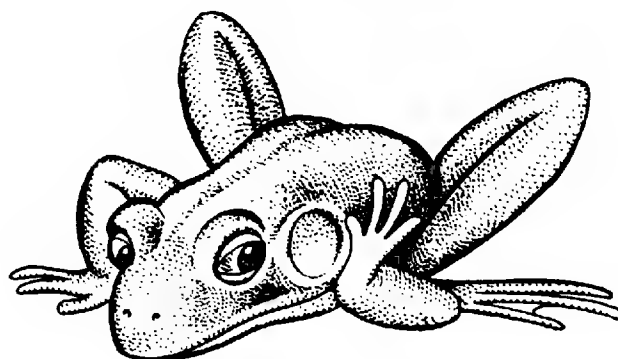
Thanks to everyone who contributed this month and to Marty Marcus, P. L. Beltz, Stephen Ragsdale, Bob Pierson, Gary R. Durkovitz, Ernie Liner, Mark T. Witwer, Ray Boldt, Steve Coogan, Rob Carmichael, and J. H. Schoenfelder for clippings sent and filed. Congratulations to Lori King-Nava who was the first to send a clipping about the CHS Herp Expo at Triton College. Special thanks to Mark Witwer for the March-April 1995 issue of *International Wildlife* which features some spectacular herp photography. You can contribute, too. Send newspaper or magazine articles with the date/publication slug and your name to: Ellin Beltz, 1647 N. Clybourn Avenue, Chicago, Illinois 60614-5507. Cards, photos and letters are also greatly appreciated even though the press of writing my M.S. thesis does not leave me much time for individual replies.

The Tympanum

Theft and Smuggling of Sungazer Lizards in South Africa

In March this year I had a really bad experience concerning a staff member of the Cape Town Snake Park and some German animal dealers. While I was away doing educational shows, I hired a seemingly competent assistant to care for and maintain my reptile collection. I learned upon my return that my assistant had traded some of my reptiles for a young yellow anaconda (for which I have no use as I breed them every year). It is the policy of the snake park never to encourage these dealers, who arrive in South Africa with suitcases full of snakes and try to trade with unsuspecting amateurs. I have met such dealers often and have discouraged any dealings with them. My assistant was warned of these types of dealers before his employment.

I discovered the following animals missing, along with various other reptiles: three sungazers (*Cordylus giganteus*); one crag lizard (*Pseudocordylus* sp.) with a front leg missing; one angulate tortoise (*Chersina angulata*); one padloper tortoise (*Homopus areolatus*), two egg-eating snakes (*Dasypeltis scabra*); and two aurora house snakes (*Lamprophis aurora*). I also discovered that my assistant had bought two reticulated pythons for R50 each (about US\$15). This transaction made no sense because these are CITES-protected animals and cost Dm175 in Germany — a really big risk for very little money.



I reported this entire matter to our Department of Nature Conservation, which promptly arrested my assistant, at the same time trying to locate the Germans. After a lot of effort the matter was laid to rest, because we thought the Germans were already out of South Africa. My assistant was

taken to court and was found guilty. He received a fine of R200 (US\$75). I now have word that the German animal dealers are still in Namibia. I have also learned that their names are Jurgen Riegel and Berend Nille. I have warned the Namibia Nature Conservatory but this is all I can do.

If anyone has any information about animals for sale, especially from Germany, please let me know. I would especially like to get back my sungazer lizards, as they form part of my breeding group (I breed this species every year). As a matter of fact, if anyone has any information of any South African reptiles available in large quantities, our Department of Nature Conservation would be interested, as the illegal trade in South Africa is growing and there is a lot of abuse of our limited wildlife.

Should you be able to help or if you have any information please contact me. **Bryan Vorster, Cape Town Snake Park, 30 Easson Road, Steenberg, 7945, South Africa.**
fax: (2721) 701 9075



My wife holding a "stack" of lizards.



Some of the younger ones.

Herpetology 1995

In this column the editorial staff presents short abstracts of herpetological articles we have found of interest. This is not an attempt to summarize all of the research papers being published; it is an attempt to increase the reader's awareness of what herpetologists have been doing and publishing. The editors assume full responsibility for any errors or misleading statements. JCM

A NEW FORM OF MATERNAL CARE IN FROGS

R. Diesel et al. [1995, Copeia (2):354-360] report on reproduction and brood care of the Jamaican frog *Eleutherodactylus cundalli* at Windsor Great Cave from 1992 to 1994. The frog entered the cave for mating and egg deposition. Males were territorial and called from exposed rock sites. Ovigerous females searched for mates and oviposition sites. Both sexes were found as deep as 87 m into the cave. Egg development was direct and exceeded 31 days. The females attended the clutch until hatching, and when the authors removed them from the nest they returned to the nest from outside the cave. Egg mortality appeared to be caused mainly by fungus infections in 1993 and by predation in 1994, possibly by crabs. Hatched froglets climbed onto the back of their mothers en masse, and she eventually transported them out of the cave. This is the first frog known to transport fully metamorphosed young. The transport seems to safeguard the passage of the offspring from the cave to the forest feeding-habitat.

AUSTRALIAN LEAF-TAILED GECKO SYSTEMATICS

P. J. Couper et al. [1993, Memoirs of the Queensland Museum 34(1):95-124] separate the new genus *Saltuarius* from the leaf-tailed gecko genus *Phyllurus* on the basis of external and internal characters and by karyotype. They assign the following species to the new genus *S. cornuthus*, *S. salebrosus*, *S. swaini* and *S. occultus*. *S. occultus* is a new species. The members of the leaf-tailed geckos are restricted to narrow, isolated patches of rainforest or heathlands in coastal Australia between the McIlwraith Range, far northeastern Queensland and the Hawkesbury Sandstone area, near Sydney. Endemic species lists for several rainforest and lists of rare, endangered or vulnerable species have been changed by this revision. *S. occultus* is recognized as the first reptile species endemic to rainforests of the McIlwraith Range.

TRADE IN PANCAKE TORTOISES

M. W. Klemens and D. Moll [1995, Chelonian Conservation and Biology 1(3):197-206] studied commercial exploitation of the pancake tortoise, *Malacochersus tornieri*, in northcentral Tanzania. Unexploited habitats produced a greater number of tortoises per unit of search time, a larger proportion of multiple tortoise occupancies per crevice, and a higher proportion of adult animals compared to exploited areas. The isolated nature of suitable habitats coupled with limited dispersal abilities and low recruitment make recovery of this tortoise in depleted populations unlikely. Commercial collecting is conducted through a well-organized, multitier system with minimal economic return for the actual collector or local middlemen. The authors found no significant threats to the survival of this species, and recommended that severe curtailment of trade is the best method to halt further depletion.

PREDICTING TURTLE SEX RATIOS BASED ON NEST COVER

F. J. Janzen [1994, Ecology 75(6):1593-1599] monitored natural nests of an Illinois population of the western painted turtle, *Chrysemys picta belli*, a species with temperature-dependent sex determination, for 4 years to investigate the relationships between vegetational cover at the nest site and hatchling sex ratio. Most nests produced hatchlings all of one sex (66% of 116 nests.) Hatchling sex ratio within nests was predictably related to the nesting beach and to the quantity of solar exposure at the nest mainly from the south. The North beach tended to produce more all-male nests than did the South beach. Within each beach, nests with more vegetational cover on the southern and perhaps western aspects produced more males than did more exposed nests. However, the relationship between solar exposure and nest sex ratio was absent during two atypically cool summers. This study suggests a possible mechanism by which female turtles choose the thermal environment of nests and hence, the sex ratio of their offspring: they may assess vegetational cover on the nest site at oviposition.

PHILIPPINE TREEFROGS

W. C. Brown and A. C. Alcala [1994, Proceedings of the California Academy of Sciences 48(10):185-220] examine the Philippine species of Rhacophoridae and find 18 species assigned to four genera; the family as a whole contains 159 species. None of the Philippine genera, but 12 of the species are endemic. A key to these frogs is presented. Two new species are described. *Philautus poecilus* is a new, intermediate-sized (21-28 mm) species known only from the type locality in northeastern Mindanao at an elevation of 1600-1800 m. The seven known specimens were collected from leaf axils 4-8 m above ground. *Philautus subrufus* is a new, 21-27 mm, species from northwestern Mindanao at elevations between 800 and 2300 m in dipterocarp and montane (moss) forest.

A NEW, SMALL, YELLOW *HYLA* FROM COLOMBIA

M. Kaplan [1994, J. Herpetology 28(1):79-87] describes *Hyla stingi* from the eastern slope of the Andes in northern Colombia. The new frog is similar in external appearance to *Hyla minuta* but osteologically distinct. It cannot be placed in any of the presently recognized species groups of *Hyla* based upon morphological characters. In spite of its superficial resemblance to *H. minuta*, *H. stingi* and *H. minuta* are not close relatives. The author shows that dorsal pattern and color are not an autapomorphy in *H. minuta*, and therefore not useful for taxonomic purposes in this species. And the author suggests that *H. minuta* is a complex of species. The new frog is named after the popular singer Gordon Sumner (aka Sting) for his commitment to save rain forests.

RATTLESNAKES METER VENOM

W. K. Hayes et al. [1995, *Copeia* (2):337-343] experimentally studied whether northern Pacific rattlesnakes, *Crotalus viridis oreganus*, inject more venom into larger prey than into smaller prey. Medium-sized and large rattlesnakes were videotaped as they each struck small and large laboratory mice. Venom measurements were made by enzyme-linked immunosorbent assay (ELISA) of whole-animal homogenate. Although medium and large snakes expended similar quantities of venom, both groups injected significantly more venom into larger mice than into small mice. Slow-motion videotape analyses indicated that behavioral aspects of striking were similar for medium and larger snakes and did not differ between size classes of prey. Likewise, no behavioral aspect of striking was correlated with the quantity of venom expended. Thus, venom expenditure was not a consequence of or constrained by some extrinsic aspect of striking such as duration of fang contact. Instead, the rattlesnakes metered more venom into larger prey through intrinsic control of venom delivery. Because of the predatory advantages for quick death and efficient digestion of larger prey, injection of more venom into larger prey is likely an adaptive strategy.

SNAKES AND OWLS AFFECT KANGAROO RAT FORAGING BEHAVIOR

A. Bouskila [1995, *Ecology* 76(1):165-178] studied the effects of predation risk from snakes on microhabitat use of kangaroo rats (*Dipodomys deserti* and *D. merriami*) in the Mojave Desert. The author concentrated on the effects of the predator on the foraging behavior of the rodents and eliminated effects of prey capture on prey population size. Foraging stations contained three seed trays, one in each of three microhabitats (Open, Bush, Grass). The amount of seed left in each tray after one night of foraging was used to assess the responses to predation risk and other foraging costs; additional data were collected during direct observations and by trapping. To investigate the effect of snakes on foraging and microhabitat use of kangaroo rats the author manipulated snake presence at the stations. The interactions between predation risk from snakes and moonlight was examined by conducting experiments near full and new moon nights. Both species of rodents preferred to forage in the Open and avoided the Bush. This preference is opposite to the preference of the main rodent-eating snake at the study site, the sidewinder, *Crotalus cerastes*, which prefers the Bush over the Open. At stations with snakes, *D. deserti* reduced its foraging and avoided the Bush more than in control plots. However, *D. merriami* foraged more at stations with snakes. *D. merriami* thus foraged at the trays that were avoided by *D. deserti*. In contrast to studies by other investigators, moonlight (which is associated with increased risk from owls) did not reduce the foraging or affect the microhabitat use of the rodents in summer; moonlight effect was seen only in the fall, when snakes were not active. Unlike risk from owls, risk from snakes is high under bushes and during dark nights. The activity of rodents in summer is a combined reaction to the different predation risks posed by snakes and owls.

DIET AND SEXUAL SELECTION IN RED-BACKED SALAMANDERS

R. G. Jaeger et al. [1995, *Animal Behavior* 49:633-639] note that during courtship periods, female red-backed salamanders, *Plethodon cinereus*, "squash" male fecal pellets and prefer to associate with males that have the residue of lightly armored prey (termites) in their feces relative to males with the residue of highly armored prey (ants). Apparently this rapid assessment of a male's diet allows females to assess his territorial quality. The authors test two hypotheses derived from these data: (1) males should preferentially feed on termites in a choice situation with ants, and (2) males should need to learn less about foraging tactics used to capture termites than to capture ants. Males were trained for 21 days on diets of only termites, only ants, both ants and termites, and neither—they were fed flies. They were then compared for their foraging successes when presented with an equal ratio of termites and ants. Under all conditions of training, males preferred to eat termites. Males learned to begin attacks on ants faster when trained on ants, and on termites faster when trained on termites. Those trained on ants learned to capture ants more efficiently (fewer tongue strikes per capture) and thus they reduced the time from encounter to capture relative to other training conditions. However, training had no significant influence on capture efficiency, which was consistently high, and time from encounter to capture of termites, which was consistently short. Therefore, males have to learn more to refine their foraging tactics with ants than with termites and are more efficient foragers on a prey type that makes them attractive to females.

EVIDENCE FOR WARM-BLOODED TYRANNOSAURUS

R. E. Barrick and W. J. Showers [1994, *Science* 265:222-224] report the oxygen isotopic composition of vertebrate bone phosphate is related to ingested water and to the body temperature at which the bone forms. The oxygen isotope bone phosphate is in equilibrium with the individual's body water, which is at a physiological steady state throughout the body. Therefore, intrabone temperature variation and the mean interbone temperature differences of well-preserved fossil vertebrates can be determined from the oxygen isotope bone phosphate variation. Values of oxygen isotope bone phosphate from a well preserved *T. rex* suggest that the species maintained homeothermy with less than 4°C of variability in body temperature. Maintenance of homeothermy implies a relatively high metabolic rate that is similar to that of endotherms.

A NEW RAINFOREST FROG FROM ECUADOR

G. Flores and G. O. Vigle [1994, *J. Herpetology* 28(4):416-424] describe *Eleutherodactylus librarius* from near Puerto Misashualli at Las Cruz Blanca, Provincia Napo, Ecuador, at an elevation of 450 m. The new species is part of the *E. frater* assembly, and is known from specimens collected only at the type locality. The floodplain of the Rio Napo provides the short, early successional growth areas as well as older secondary growth areas this species inhabits. All specimens were found at night on vegetation 0.5-2 m above the ground.

SEXUAL DIMORPHISM IN A SOUTH AMERICAN LIZARD

V. Perez-Mellado and I. de la Riva [1993, *Copeia* (4):969-976] note that the lizard *Tropidurus melanopleurus* is highly dimorphic and inhabits the eastern slopes of the Andes from Argentina to Peru. Adult males are larger than females and have longer, wider heads. The hind legs show isometric growth in females and negative allometric growth in males, as do head width and head length of both sexes. The sexes also differ in thermoregulation and diet. Males appear to be thermoregulators, while females are thermoconformers. Females are active over broader ranges of body temperature. Males prey upon a wide variety of arthropods, while females have a narrow diet, specializing in feeding upon ants; subadults feed almost exclusively upon ants.

SOUTH CAROLINA RACER MOVEMENTS

M. V. Plummer and J. D. Congdon [1994, *Copeia* (1):20-26] followed racers, *Coluber constrictor*, with radiotelemetry in an old field/forest habitat surrounding a Carolina bay in South Carolina. Racers were active on approximately 70% of days; inactive snakes were usually in ecdysis. Active racers were relocated on the ground's surface (40%), above ground in shrubs and trees (35%), and underground (25%). Habitats in which racers were relocated were: thickets and grassland shrubs (50%), woodland/forest (25%), and grassland (25%). Active snakes moved an average of 104 m/d within home ranges averaging 12.2 ha, estimated as minimum convex polygons. The home range of each snake included as least a portion of the bay and overlapped with the home ranges of other snakes. In comparison with other studies of racers in which data were collected, analyzed, and presented in the same manner as this study, home range size and daily movements of South Carolina racers are significantly greater. Possible explanations for the greater movement include trophic level differences and a proximate response to local drought.

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FOOD SUPPLY AND THE HYLID TADPOLE

J. Leips and J. Travis [1994, *Ecology* 75(5):1345-1336] examined how changes in food availability during development affected the timing of metamorphosis and body size at metamorphosis in two closely related species of treefrogs that use different larval habitats. The authors raised *Hyla gratiosa* (a temporary pond breeder) and *Hyla cinerea* (a permanent pond breeder) at two different temperatures on either constant resources or on a regime in which food levels were altered at one of three times during development. For both species larval period was affected only by early changes in food level; early increases shortened larval period, and decreases lengthened it. The timing of metamorphosis of *H. gratiosa* showed greater plasticity because of its greater overall response to any food-level change and not because of any difference between species in the duration of the sensitive period. The two species showed comparable levels of plasticity in body size at metamorphosis; increase in food level produced larger body sizes, and decreases produced smaller sizes. However, in contrast to the pattern seen in larval period, later changes in food level had the greatest effect on body size. These results demand a reexamination of current ideas about the adaptive significance of plasticity in the timing of metamorphosis in response to food availability in larval anurans.

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For sale: herpetological books and papers through a mailbid auction. Send your name and address to receive the auction list and bidding instructions. R. D. Worthington, 740 Tepic, El Paso TX 79912, (915) 584-8549.

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For sale: large selection of captive born reptiles and amphibians, books and supplies. Send S.A.S. business-size envelope for complimentary price list or \$5 for a 1-year subscription (bi-monthly), to Twin Cities Reptiles, 540 Winnetka Avenue North, Golden Valley MN 55427, (612) 593-0298.

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For sale: c.b. '95 leopard geckos, \$25–35, males available; c.b. '95 bearded dragons, starting at \$65. Curt or Ann, (314) 772-0435.

For sale: **baby leopard geckos**, from hi-yellow, zoo-born parents, well started on nutrient loaded, vitamin/calcium supplemented ¼" crickets and small molted mealworms, *great pets*, \$25 each (detailed care sheet included). Rob Carmichael, (708) 615-4388 leave message on voice mail.

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For sale: female rhinoceros iguana, c.b. '93, \$795; one male and one female adult Cuban rock iguanas, \$1750/pair; *Uromastix acanthinurus*, \$390; *U. aegyptius*, \$75; Baja blue rock lizard, c.b. '93, \$85. Randy, (817) 613-1242 (6 – 9 P.M. Central Time). [TX]

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For sale: rhinoceros iguanas; Cuban iguanas; green iguanas; *Geochelone sulcata*; *G. elephantopus* (Florida sales only). D. J. or Sam, (305) 680-8492. [FL]

For sale: c.b. hatchling snakes. Baird's rats, \$30; eastern milks, \$10; Sinaloan milks, \$60; gray-banded kings, \$90; California kings, \$20. Henry Cohen, 24 St. Johns Place, Buffalo NY 14201, (716) 881-6724.

For sale: 1995 hatchlings. Trans-Pecos rat snakes, \$35 each; Baird's rat snakes, \$25 each; Mexican hognose snakes, \$35 each [permit needed in IL]; western hognose snakes, \$25 each [permit needed in IL]; prairie kings, \$25 each; California kings, \$25 each; gray-banded kingsnakes, various localities, \$100 and up; *ruthveni*, \$75 each; Durango mountain kings, \$100 each; Mexican milksnakes, Pueblans, \$50 each; red milks, \$35 each; Mexican black kings, \$40 each; prairie-speckled crosses, \$50 each; Arizona mountain kings, \$125 each. Rosy boas: *trivirgata trivirgata*, \$50 each; *t. roseofusca*, \$75 each; *t. saslowi*, \$100 each. Steve Mitchener, 2928 Kerry Lane, Oklahoma City OK 73120, (405) 748-6566 after 6 P.M. Central Time.

For sale: 1995 offspring — Brazilian rainbow boas from bright red adults, \$250; albino Burmese pythons, \$100; reticulated pythons, \$100; leucistic Texas rat snakes, \$100; albino corn snakes, \$25 (quantity available). Also one male and one female albino prairie kingsnakes, proven breeders, \$200/pair. Michael Kostakos, (718) 746-7352. [NY]

For sale: male *thayeri*, c.b. '94, gorgeous, \$100; male black pine snake, c.b. '93, very dark, \$100; female western hognose, c.b. '91 — big, healthy animal but lays infertile eggs — \$50 [permit required in IL and MO]. Also this year: corns, hetero for amelanistic, \$15, amelanistic, \$25, snows, \$32.50; Pacific striped gophers (*Pituophis melanoleucus catenifer*), albinos, \$55, heteros, \$30; western hognose (*Heterodon n. nasicus*), \$35 [permit required in IL and MO]; California kings, regular banded, \$30, albino banded, \$35, lavender and desert phase, \$50; desert kings (*Lampropeltis getula splendida*), \$45; Mexican black kings (*L. g. nigrita*), \$40; Mexican black king/Cal. king cross (these animals intergrade naturally in the wild and are diversely patterned), \$40; prairie kings (*L. c. calligaster*), amelanistic, \$50, heteros, \$15; San Luis Potosí kings (*L. m. mexicana*), \$60–90; variable or Nuevo León kings (*L. m. thayeri*), buckskin leonis phase, \$100, melanistics, \$125; grey-banded kings (*L. m. alterna*), *alterna* or Blair's phase, \$75–150; Chihuahua mountain kingsnakes (*L. pyromelana knoblochi*), \$300; Arizona mountain kingsnake (*L. p. woodini*), \$90–125; milks — *annulata*, \$60, *campbelli*, \$60–90, *hondurensis*, regular, \$90, tangerines, \$100–125, *arcifera*, \$125, *nelsoni*, \$85, *sinaloae*, \$65; trans-Pecos rats (*Bogertophis subocularis*), axanthic, \$1000, hetero for axanthic, \$500, blond axanthic, \$1000, blonde hetero for axanthic, \$750. Unrelated offspring available for most stock. All animals are feeding on rodents and *healthy*. Quantity pricing is always available. Troy, (314) 642-9422. [MO]

Advertisements (cont'd)

For sale: three male and three female c.b. '95 black-tailed cribos (*Drymarchon corais melanurus*), eating pinkies, \$300/pair; two male c.b. '95 gray-banded kingsnakes, Blair's phase, eating pinkies, \$125 each; two male and two female tangerine Honduran milksnakes, \$300/pair. Gary Gaziano, (800) 603-7500. [Bay Area CA]

For sale: 3½' female eastern kingsnake, *Lampropeltis g. getula*, proven breeder, \$30. Ralph, (708) 205-9890.

For sale: one male red rat snake (*Elaphe g. guttata*), wild-caught as a hatchling in central Florida in '91, and one female amelanistic red rat snake, beautiful pale background with bright orange/red blotches, c.b. '91, proven breeders, \$150/pair. Also available: Langtry *Lampropeltis alterna*, Blair's phase, c.b. '95 from light phase female and dark grey/bright orange male, \$100 each. Will consider trades for above animals. Michael Murphy, 1202C Hidden Place, Tallahassee FL 32304, (904) 574-7007.

For sale: Scaling back! Two male and two female *Boa constrictor amarali*, c.b. '88 & '89, \$5500/group; three male and three female *B. c. longicauda*, c.b. '91, two bloodlines, \$3600/group; one male and one female Surinam redtails, c.b. '90, gorgeous, \$1200/pair; two male and three female c.b. red blood pythons (1.1 yearlings, 1.2 two-year-olds), three bloodlines, \$2500/group; one male and one female jungle carpet pythons, c.b. adults, average, \$1000/pair; one c.b. '90 *Corucia zebrata*, \$100. Rob Nathan, (216) 467-5105 leave message. [OH]

For sale: Argentine boas (*occidentalis*), c.b. 6/1/95, unrelated parents, some pairs left, \$500/pair, extra females, \$250 each; NW Peruvian boas (*ortoni - longicauda*), c.b. 6/15/95, unrelated parents, rare in collections, selling fast, group of one male and two females, \$400 each, extra females, \$400 each; Mexican boas, c.b. 6/17/95 & 6/24/95, c.b. parents from institution, true Sonoran Desert, finest available, seldom seen in private collections, \$150 each extra females; Borneo blood pythons, most 2nd generation c.b., from picks of the litters, \$125-150, also yearling males; one male and two female Crawl Cay boas, c.b. '94, inquire; Dumeril's due soon. Tim or Janice, (903) 454-1312. [TX]

For sale: Hog Island boas, c.b. '95, two different bloodlines, \$550/pair; Nassau boas (*Epicrates striatus strigilatus*), c.b. '95, from c.b. adults, \$600/pair; Missouri red milks, c.b. '95, from "exceptional" red and white adults, \$200/pair; Hondurans, \$100 each; *Lampropeltis pyromelana knoblochi*, \$300 each. Doug, Box 384, Benicia CA 94510, (707) 745-5583.

For sale: 6½' female boa constrictor, proven breeder, \$200; c.b. '92 male Arizona mountain kingsnake, \$125. Jack Phillips, (708) 724-4552.

For sale: 1995 captive bred boids. Hogg Island boas from exceptional adults, \$325; Brazilian rainbow boas from iridescent orange adults, \$225; Colombian rainbow boas from iridescent, high-contrast adults, \$75. Unrelated pairs available. Can deliver to Chicago/Milwaukee area. Mark Wendling, (319) 857-4787. [IA]

For sale: Queensland carpet pythons (*Morelia spilotes variegata*) c.b. '95, \$300/pair; female Namib sand gecko (*Chondrodactylus angulifer*), c.b. '93, proven breeder, \$300; Madagascan ocelot gecko (*Paroedura pictus*), c.b. '95, \$25; male Stimson's python, (*Antaresia stimsoni*), c.b. '94, from the bloodline that started it all, \$650; Queensland spotted python (*Antaresia maculosa*), c.b. '95, very clear pattern, light tan and black blotches, \$125; big leopard geckos (*Eublepharis macularius*), a bloodline I have been breeding for five years that can get up to 11 inches and 150 grams, \$75 each; Malaysian red blood pythons (*Python curtus*), c.b. '95, feeding, fifth generation captive born, \$200 each. All animals listed are of my own private breeding stock, not wild-caughts or someone else's surplus. Steven Bostwick, (515) 967-5716. [IA]

For sale: expected '95—deposits accepted. Pythons—blackheads, womas, green trees, diamonds, jungle carpets, rings, bloods (red and black) and Children's. Boas—emeralds, Hog Islands, Madagascan tree (*Sanzinia*), Bolivian redtails, Argentines, Brazilian rainbows, Dumeril's and sand boas. Tortoises—Aldabras (3"-24"), Hermann's, marginateds, redfoots, leopards and others. For price list send a one-time fee of \$3, which includes a '95 list (and *all* future lists) and color photos. Dick Goergen, P.O. Box 225, Alden NY 14001, (716) 681-4518.

For sale: jungle carpet python (*Morelia spilota cheynei* × *variegata*), 75% jungle carpet, yellow with brown blotches highlighted in black, c.b. '95, \$250; one male eastern Stimson's python (*Antaresia stimsoni orientalis*), c.b. '94, \$750; super leopard gecko (*Eublepharis macularius*) *can get* 11 inches long, c.b. '95, \$100. Steve Bostwick, 901 4th Street SW, Altoona IA 50009, (515) 967-5716.

Pet-sitting service: Complete in-home pet and plant care, specializing in reptiles and other unique pets. Dogs and cats welcome with open arms, midday dog walking. Experienced and dependable service by devoted animal lovers, serving Chicago and suburbs, reasonable prices, fully insured and bonded. Ask about our habitat consultation and custom-made cages. Exotics & More, (312) 728-5457 or page us at (708) 750-3688.

Software: **TRACS™**—Total Reptile and Amphibian Control System. The most complete database and reporting solution for automating your breeding records. Perfect for hobbyists, commercial breeders and institutions. Only \$129. IBM PCs and compatibles. For more information or ordering contact Marcia Rybak at Leapin' Lizards, 736 N. Western Avenue, #315, Lake Forest IL 60045, (708) 735-8205 phone or (708) 735-8206 fax.

Tours: Five-day South Carolina herp and fossil tours, April–November 1995. Mini expeditions in search of 30-million-year-old turtles and crocodilians; living reptile hunts (vipers, king and rat snakes, turtles, anoles, broadhead and five-lined skinks, treefrogs and other amphibians), exotic reptile shopping and camping in a black water swamp forest. Finest Charleston hotels beginning and end of each tour. Twelve people per tour. Family plans available. \$489. For reservations call Steve Faust, (800) 894-TOUR.

Tours: Custom-designed tours to Costa Rica, Panama, Belize and Guatemala. Expeditions to fit the specialized needs of herpers, photographers, educators, writers, professionals in search of data, and travelers just interested in visiting these countries (with or without their families). From \$649. Steve Faust, (800) 894-TOUR.

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Tours: Limited bookings available for guided tours of herpetological collection sites in Nevada. Call or fax (702) 471-0240 for reservations. For a brochure send SASE to: CRC, P.O. Box 0731, Las Vegas NV 89125-0731.

Wanted: adult male Namib Desert gecko (*Chondrodactylus angulifer*). Henry Cohen, 24 St. Johns Place, Buffalo NY 14201, (716) 881-6724.

Wanted: two female Hermann's tortoises (*Testudo hermanni*). Lynn Dickason, (918) 747-7523 (o) or (918) 742-3449 (h). [OK]

Wanted: *Uromastix acanthinurus*. (817) 613-1242 (6 – 9 P.M. Central Time). [TX]

Wanted: bearded dragons, *Pogona vitticeps*. Will be attending the Florida Reptile Show in Tampa. Mark, (813) 977-1613.

Line ads in this publication are run free for CHS members — \$2 per line for nonmembers. Any ad may be refused at the discretion of the Editor. Submit ads to: Michael Dloogatch, 6048 N. Lawndale Avenue, Chicago IL 60659, (312) 588-0728 evening telephone or (312) 782-2868 fax.

News and Announcements

1995 UPSTATE HERPETOLOGICAL ASSOCIATION GRANT

The Upstate Herpetological Association (UHA) is now accepting applications for a grant in the amount of \$500. This grant is intended to support herpetological conservation, education or research. All proposals must be received on or before September 15, 1995. The successful applicant will be notified on or before November 15, 1995.

Applicants need not be a member of UHA nor a professional herpetologist but shall be able to demonstrate a sincere interest in herpetology and the ability to complete the endeavors for which the grant is awarded. Successful applicants will be expected to submit a report of their work for publication in the association's newsletter, "Herp Beat," and/or give a presentation to either the Syracuse or Albany chapter of the UHA. It is expected that the successful applicant will acknowledge the UHA's support in any publications that result in part or wholly based on funding by UHA.

Applications should include the purposes for which the grant is requested, the uses to which the grant will be put, and enough background information to enable reviewers to assess the applicant's ability to accomplish the objective for which the grant is requested. All applications should include a budget for the project and a completion date for the project. Applications should be held to a maximum of five pages, typed, double spaced. The reviewers will be instructed to consider all proposals but may exercise a bias toward original research, New York herpetology, and captive husbandry and propagation of reptiles. The UHA reserves the right to reduce the grant, divide the grant between two or more individuals or make the grant to an organization as a whole. Applications should be submitted to UHA, % Ed Schoene, D.V.M., HCR 68, Box 30B, Springfield Center NY 13468. Questions should be directed to Dr. Schoene.

BIOLOGICAL CONTROL OF CANE TOADS IN AUSTRALIA

The Australian Animal Health Laboratory is currently investigating the potential of selected microbial pathogens as agents that might be used to control or eradicate the introduced cane toad (*Bufo marinus*) in Australia. The lab would like to establish formal contact with scientific colleagues who have access to viral, bacterial, fungal, protozoan or metazoan pathogens derived from amphibians, or who may know of outbreaks of disease or unusual mortalities in amphibian populations. If you think you may have information that could be of assistance, please contact either Dr. John Humphrey or Dr. Alex Hyatt, CSIRO Australian Animal Health Laboratory, Private Bag 24, Geelong, Victoria 3220, Australia. Telephone: 61 52 275 000. Fax: 61 52 275 555. E-mail: alex@aahl.dah.csiro.au or johnh@aahl.dah.csiro.au.

REPTILE HOUSE BBS

The Reptile House BBS is a fully dedicated, nonprofit herpetological bulletin board computer system, offering a variety of reptile-related files and care sheets for downloading, as well as an ever-growing message base where herp-keepers from all over the country can talk about their reptiles and amphibians, and the latest info on husbandry and legal issues. The bulletin board can be called by modem at (718) 370-0012. To contact the sysop directly, write or phone Kevin Egan, Reptile House BBS, P.O. Box 131836, Staten Island NY 10313, (718) 370-8660 telephone or (708) 370-0929 fax.

MID-ATLANTIC REPTILE SHOW 1995

The Mid-Atlantic Reptile Show 1995, sponsored by the Maryland Herpetological Society, will take place September 16-17. The show itself will be at the Maryland State Fairgrounds with lectures to be held at the Timonium Holiday Inn. The show features sales of captive born reptiles (only), equipment and books. There will also be raffles, door prizes, book signings both days and a children's art display. Scheduled speakers are Sherman A. Minton, M.D., Dr. David Chiszar, Philippe deVosjoli and Scott Stahl, D.V.M., plus a photographer's presentation by Mike Fleet. Proceeds from the show (\$18,000 and \$22,000 in 1993 and 1994 respectively) go to purchase rainforest through the Ecosystem Survival Plan. Show T-shirts are available by mail for \$17 postpaid from the Maryland Herpetological Society, 2643 N. Charles Street, Baltimore MD 21218-4590. For information, contact show coordinator Tim Hoen at (410) 557-6879.

TRUST FUND FOR GEORGE VANHORN

Since opening the St. Cloud, Florida, Reptile World Serpentarium in 1972, George VanHorn has always been there for fellow herpetologists in need. Sometimes with advice, sometimes with life-saving antivenom. On 21 June 1995 George was severely envenomated by adult king cobra (*Ophiophagus hannah*) during a venom extraction procedure. George survived the bite but remains in the hospital with recovery complicated by a fasciotomy. Length of hospital stay has been estimated at 4-5 weeks. Inquiries from friends and colleagues wishing to help offset medical bills have resulted in the establishment of the George VanHorn Trust Fund. One hundred percent of all money collected will be used to help pay medical bills. Contributions should be made payable to the George VanHorn Trust Fund (acct. # 6656366997) and mailed to: Barnett Bank, Attn: Patricia Melzer, 4300 13th Street, St. Cloud FL 34769.

UPCOMING MEETINGS

The next meeting of the Chicago Herpetological Society will be held at 7:30 P.M., Wednesday, August 30, at the Field Museum of Natural History, Roosevelt Road at Lake Shore Drive, in Chicago. The speaker will be John McGrath of Columbia, Missouri. John will speak on the care and breeding in captivity of the European fire salamander, *Salamandra salamandra*.

The September 27 meeting will feature Douglas Mader, D.V.M., of the Long Beach Animal Hospital in California, speaking on "Advances in Herpetological Medicine." Dr. Mader will discuss new and exciting breakthroughs in the medical care of reptiles and amphibians in captivity. He will use actual cases to illustrate just how far herpetological medicine has advanced in recent years.

We are required to use the entrance on the west side of the museum. We have permission to use the staff parking lot to the west of the museum. Entrance to this lot is from McFetridge Drive, the wide street just to the south, between the museum and Soldier Field. There is also free parking available in the lot to the north of the museum. The #146 CTA bus goes directly to the museum. Unfortunately, it does not operate after 9:00 P.M. However, after the program anyone needing a ride to a CTA stop will have no trouble finding one—just ask any board member.

Turtle Club

The Chicago Turtle Club will meet Sunday, August 27, 1:00–3:30 P.M., at a new location, the North Park Village Nature Center, 5801 N. Pulaski, in Chicago.

SEPTEMBER 23–24 HERPETOLOGICAL WEEKEND

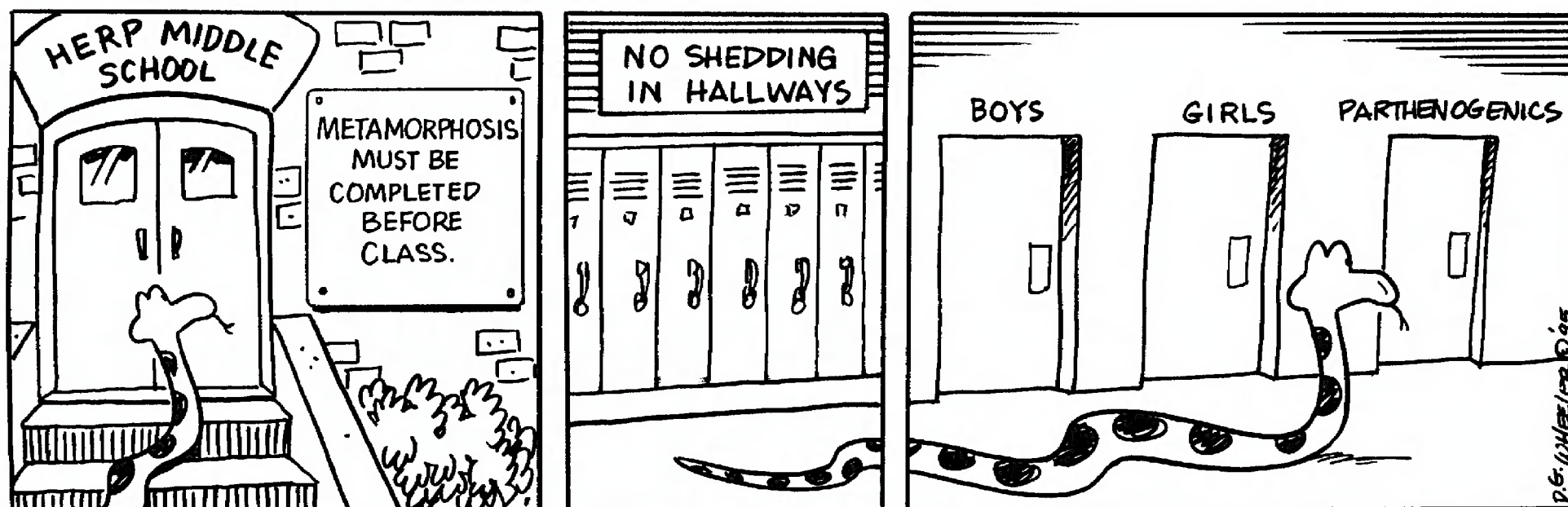
As many of you are no doubt aware, the Chicago Academy of Sciences currently occupies temporary quarters at North Pier, 465 E. Illinois Street (just across Lake Shore Drive from Navy Pier). This will be the site for the 13th annual HerPETological Weekend put on by the CHS under the auspices of the Academy. The show will take place over the weekend of September 23–24, from 10 A.M. to 4:30 P.M. on Saturday and from Noon to 4:30 P.M. on Sunday. We urge all CHS members to bring some of their favorite animals and suitable containers in which to display them. We plan to reimburse exhibitors for parking fees. For more details attend the August 30 CHS meeting or phone Ron Humbert at (708) 620-7377.

DONATIONS TO THE JULY 26 RAFFLE

The following is a listing of those individuals and businesses who generously donated items for our monthly raffle at the July 26 meeting. The donated items are shown in parentheses.

Ghann's Cricket Farm (cricket food); Reptile News Press (*Guide to Bullsnares, Pine Snakes and Gopher Snakes, Complete Guide to Reptile Nutrition, Complete Guide to Keeping Monitors*, snake mug, iguana mug); Tetra Terra fauna (ReptoVit, Shed Aid, land turtle, tortoise & iguana food); ZooMed (Repti-Oasis, clamp lamp, canned reptile foods, tank heater, hermit crab food); Rep-Cal (Rep-Cal, T-shirt); Fancy Publications (*Reptiles* subscription); Marcia Rybak (snake earrings); Rolf Hagen Corp. (Nutrafin turtle pellets); Kraig Adler-SSAR (color plates); Suttan Studios (portrait sitting); Ecologic Technologies (Rainmaker I); Terrarium Art (rock bowl); Big Apple Herpetological Supplies (Pearlco heating element); Dave Northcott (Reptiles & Amphibians of the World); Midwest Custom Products (snake hook); Rainbow Mealworms (cricket gift certificate); Advanced Vivarium Systems (*Arachnomania*).

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